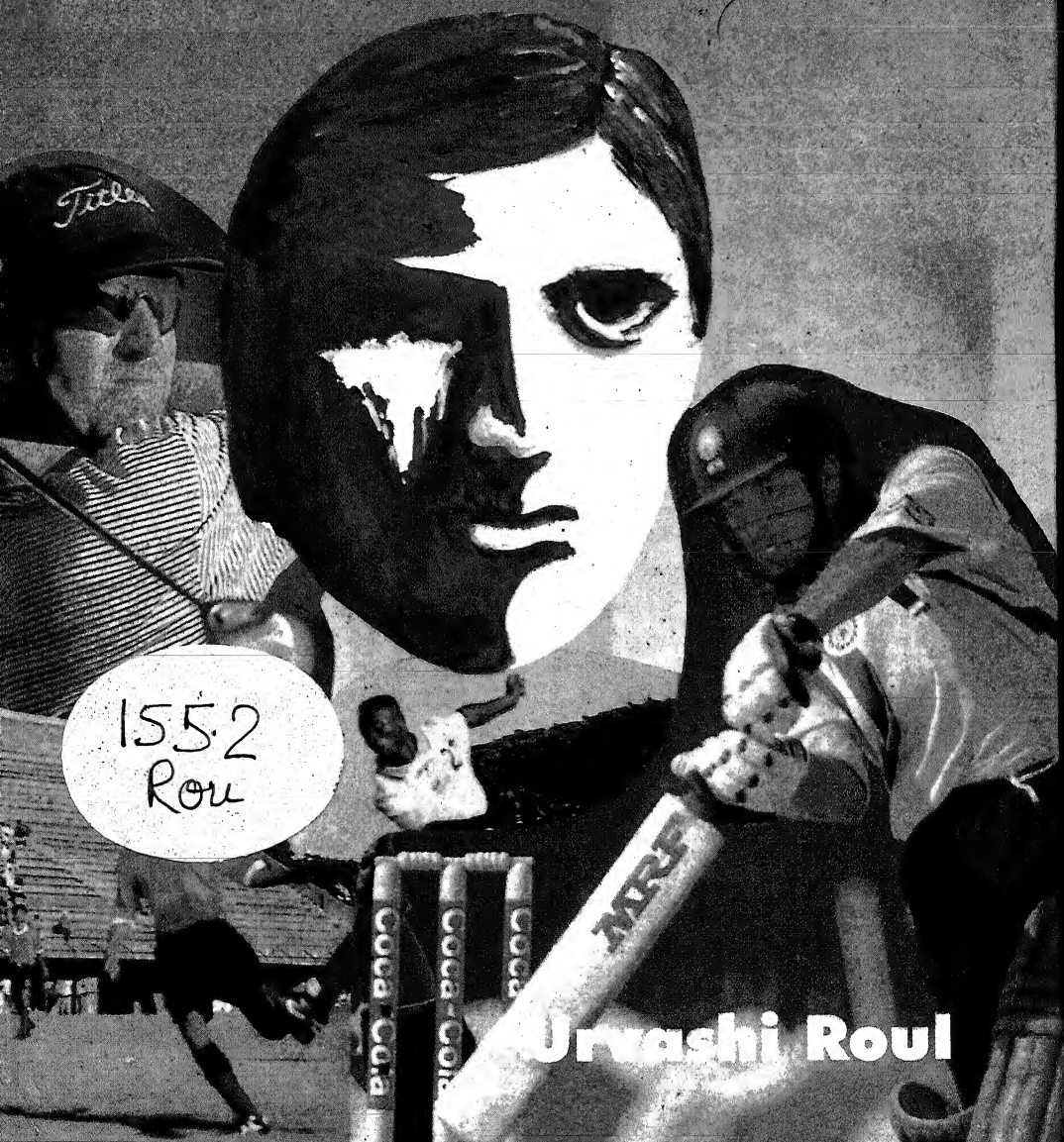


SPORTS AND PERSONALITY



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Urvashi Roul



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Foreword

In the era of competitive sports, the assessment of personality traits of the young sportspersons has become the need of the hour. It facilitates the identification of the psychological components of the sport talent among the budding sportspersons. Sports personology is an emerging area in the discipline of sports psychology which has attracted the attention of sports scientists, scholars and researchers. The present book "Sports and Personality" is the outcome of the research work done by Dr. (Mrs.) Urvashi Roul, Lecturer in Psychology, Government College, Mohali under the scholarly supervision of Dr. Agya Jit Singh, Head, Department of Psychology, Punjabi University, Patiala. This book deals with the follow-up study of 103 male and 76 female sportspersons, undergoing training in the different sports hostels of Punjab, selected under the sports talent search scheme of the Sports Authority of India. This task was accomplished in four stages after a gap of six months on the same sportspersons. The author has tried to identify the undergoing differences in their personality traits, which are created by the training environment and also person situation interaction at a given point of time. A sustained effort has been made to find out the changes in their level of sports performance over a period of time.

Under interactional paradigm, the task of sports personality researchers is to construct a meaningful sports situation from the environment that interests them and makes the athletes to respond to these situations on the basis of a variety of personality characteristics.

This book would prove to be very useful to the sports scientists, coaches, physical educationists and sports administrators because

it has wide implications in the selection and training of sports-persons at the school and college level.

The author deserves appreciation for conducting a fruitful psychological study which has meaningful application in the field of sports. She has laboured very hard in bringing out such a good work as is to be hailed as the first of its kind in India. I present this book to the readers, scholars and sports scientists in the hope that it will prove to be trend setter in field of Sports Psychology.

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Interactionism Paradigm in Personology

Personality and Personology

The terms personality and personology are sometimes misconstrued by many. Often, they are interchangeably used by psychologists and research scholars. However, before going to differentiate between the two, it is worthwhile to know the way these terms came into use by the exponents of modern psychologists.

Hall and Lindzey (1979) are of the opinion that "no substantive definition of personality can be applied with any generality." By this what they mean is that the way in which individuals will define personality will depend completely upon their particular theoretical preference. Allport (1937) in an exhaustive survey of the literature extracted almost fifty definitions of personality. After detailed summary and critique, Allport attempted to combine the best elements of the previous definitions while avoiding their major shortcomings. He suggested that personality may be defined as "What a man really is." However, realizing that this is too abbreviated definition of personality which is inadequate to encompass the entirety of personality, he proceeded to suggest his better known definition which is as follows :

"Personality is the dynamic organization within the individual of those psychophysical systems that determine his unique adjustment to his environment" (Allport, 1937).

In 1961 revision of his major work, Allport somewhat modified his personality definition by substituting a new phrase for the previous "Unique adjustment to his environment." The modified definition now ended with the phrase, "characteristic behaviour and thought." Thus, Allport recast his definition as: "We not only adjust to our environment but we reflect on it. Also, we strive to master it, and sometimes succeed. Behaviour and thought, therefore, make both for survival and for growth."

Personality, as a unique pattern of traits, which is a commonly termed as the Trait Theory of Personality, came to be associated initially with Cattell (1956), Guilford (1959), Eysenck (1960) and Maddi (1970).

The aforesaid exponents of personality embarked upon a trait perspective. The basic assumption underlying such perspective of personality is that people possess predispositions to respond in a particular way. Such predispositions are called traits. A trait lends consistency to personality by allowing the person to respond similarly to a wide array of situations. Allport (1961), a strong advocate of the trait approach, defined the concept in this way: A trait is a neuropsychic structure having the capacity to render many stimuli functionally equivalent, and to initiate and guide equivalent (meaningfully consistent) forms of adaptive and expressive behaviour. According to the trait model, an individual can be described in terms of a combination of traits (e.g., dependency, anxiety, aggressiveness, achievement), which are supposed to be stable latent dispositions. The latent dispositions determine a person's behaviour across different situations. Given this point of view of trait theory, it is not sufficient to merely study the individual. Situations are taken into account as in Allport's behaviour equation, i.e., $R = f(P, S)$, but the provoking and restricting effect of situational factors on behaviour is not supposed to change the rank order of individuals for a given trait. This means, as Argyle and Little (1972) say, that the rank order of individuals for any given trait is supposed to be the same for different situations, independent of situational characteristics, except for errors of measurement. Hence, it amounts to saying that the factors determining behaviour are within the individual. Hence, for all practical purposes for the trait theorists, behavioural equation becomes $B = f(P)$, Endler and Magnusson (1976).

According to Lazarous and Monat (1979), personology is the study of personality which personologists think as the underlying, relatively stable, psychological structures and processes that organize human experiences and also a person's actions and reactions to the environment. According to Vealey (1989) personology is the study of the interpersonal characteristics that make individuals unique. Personality is usually associated with the trait perspective whereas personology though, normally understood as study of personality, is a much wider definition encompassing other underlying factors in addition to traits and their interactions determining the behaviour of the individual. Both the cognitive and perceptive world of the individual are influenced by the situational factors. Hence, personology is a much wider term than personality.

The fundamental assumption of a trait theory that behaviour is stable or consistent across situations has been criticised based on empirical studies. The terms, cross situational variability and behaviour specificity, have been interchangeably used. Behavioural specificity refers to the fact that behaviour is greatly influenced by situations and therefore is subject to considerable variability. Cross situational variability of behaviour refers to the same thing implying that behaviour of an individual does vary across situations. A good number of studies by Mischel (1968, 1969, 1971), Vernon (1964), Pervin (1968), Argyle and Little (1972), Endler (1973, 1975 A, 1975 B), Endler and Magnusson (1974), Argyle (1975), Cheek (1982), Zanna et al (1980), Keneric et al (1980), Mischel and Peake (1982), Gormly (1983), Diener et al (1984), Wright and Mischel (1987), Ozer (1986), Ozer and Gjende (1989), Van Heck (1989) and Buss (1991) have supported the variability of individual behaviour across situations.

In addition to the apparent inconsistency of behaviour as reported above in several empirical studies, the trait model is criticised on account of its negligence of factors other than personal factor in determination of behaviour.

Person Situation Debate : A Pseudo Issue

Hunt (1966) and Endler (1973) have indicated that the question of whether individual differences or situations are the major sources of behavioural variance, like many issues in the history of science,

turns out to be a pseudo issue. Even a trait theorist like Eysenck (1978) held :

“Altogether I feel that the debate is an unreal one. You cannot contrast persons and situations in any meaningful sense or ask which is more important, because clearly you will have persons-in-situations and the relative importance of factors on personality depends on the nature of the situation, the selection of people, and in particular the selection of traits”.

The most extreme trait position would postulate that individual behaviour would be attributed solely to factors within the person, implying that no inter-individual differences in behaviour would be due to the situations in which behaviour occurs. Similarly, the most extreme situationistic position would postulate that individual behaviour is solely determined by situational/environmental factors and that person factors and interactions do not contribute at all to behaviour variation. As Endler and Magnusson (1976) say, the difference among these view points is primarily a matter of relative emphasis placed on various factors. However, on the basis of empirical research during the 1960s and the 1970s, it was found that both persons and situations, to be more specific, person by situation interaction is most important determinant of behaviour (Magnusson and Endler 1977).

Interactionism Paradigm in Personology

According to Shute (1973), Aristotle was the first to formulate an interactionist view of behaviour. In modern age Kantor (1924, 1926) stated that the unit of the study for psychology was the individual as he interacts with various types of situations which constitute his behaviour circumstances. Among the modern psychologists, Tolman (1935) in his behaviouristic combination of purposiveness on cognitive theory emphasized an interactionist view of behaviour by stressing the necessity of taking situational factors as well as person factors into account. He involved an equation for the determination of actual behaviour which is as follows :

$$B = f(S, H, T, P),$$

where, *S* is environmental stimuli, *H* is the heredity of the organism, *T* is the past training of the organism and *P* is the physiological appetite or aversion. Lewin (1935, 1936, 1938, 1951) through his field theory presented an interactionist viewpoint of behaviour. He emphasized the interaction between personality and a meaningful environment, and maintained the indispensable interdependency of personal and situational factors in eliciting behaviour. Interaction between personal factors and environmental factors was also emphasized by Mead (1934).

The interaction between personal factors and situational factors was also an essential characteristic of Murray's (1938) need-pressure theory. According to him, the unit of analysis for the study of personality is the organism-environment interaction, rather than either per se. He stated that "since, at every moment, an organism is within an environment which largely determines its behaviour, and since the environment changes—sometimes with radical abruptness—the conduct of an individual cannot be formulated without a characterization of each confronting situation, physical and social" (Murray, 1938, p).

Angyal's (1941) concept of biosphere highlighted the importance of the meaningful environment and maintained the Lewinian viewpoint that the individual-environment construct is unique and cannot be decomposed into persons and environments. Murphy's (1947) biosocial theory of personality emphasizes the biological organism, the individual personality, the society, the physical environment and the field nature of events wherein interchanges between organism and environment take place. Hence, Murphy's biosocial theory is basically an interactionist theory.

Brunswick (1952) is another field theorist who insisted on the value of naturalistic, ecological study of the organism in its environment. In his probabilistic functionalism system, he considered the totality of interacting factors to evaluate psychological system and behavioural problems. Brunswick's Lens model illustrates the way in which a variety of different but interacting process can be initiated from a single focal factor such as an object in the stimulus situation and also the way in which a similarly differentiated array of response processes mediated within the organism may focalize into a single perceptual or instrumental achievement.

Sakoda (1952) expressed his belief in the interactionist approach to study behaviour. Sullivan's (1953) interpersonal theory is

basically an interactionist theory. According to him personality is the relatively enduring pattern of recurrent interpersonal situations which characterize human life. He believed that the personality of an individual can never be studied in isolation, since it never exists in isolation i.e. separate and independent from other personalities.

Social learning theory of Rotter (1954) is a creative synthesis of reinforcement and cognitive or field theories of human behaviour. Rotter is basically an interactionist in his analysis of clinical and real life conditions. In his explanation of social learning, he gives individual differences and environmental events equal weight. His social learning theory postulates the interaction of four major elements : (i) behaviour potential, (ii) expectancy, (iii) reinforcement value and (iv) the psychological situation. Behaviour potential is the probability of occurrence of a behaviour in a situation ; it is dependent on the type and amount of reinforcement available for his behaviour. Expectancy refers to a prediction made by the person that a particular behaviour expressed in a given situation will receive reinforcement. Reinforcement value is the value that an individual places on a particular kind of reinforcer. The psychological situation is the situation as uniquely experienced by the individual.

Kelly's (1955) personal construct theory has elements of interactionism. For Kelly, the most essential characteristic of human beings is that they construct their environment giving meaning, or interpretation, to the social and physical events that surround them. It is by means of these cognitive constructions that people act and move about in their world.

Since 1960's, the person-situation interaction model advocated by the above mentioned psychologists has been empirically tested by many investigators. The modern formulations of interactionism began to appear concurrent with the first empirical studies on person-situation interaction. Sells (1963) while suggesting usefulness of scales which would clarify the effects of individual and situational factors which account for significant variance in behaviour, enunciated the interaction principle of behaviour. According to him the interaction of the individual and the environmental situation implies that the total variance of any response can be accounted for only in part by individual differences in characteris-

tics of the environmental situation (both physical and social) and in part on the interaction between aspects of each.

Raush (1965) demonstrated two methods, i.e. (i) the multivariate informational and (ii) that of transitional analysis for studying the sequential aspect of social interaction. However, the seminal contribution to modern interactionism was from Endler and Hunt (1966, 1968, 1969) and Magnusson, Gerzen and Nyman (1968). In their path-breaking article in 1966, Endler and Hunt used the variance component methodology as developed by Gleser, Cronbach, and Rajaratnam (1965). From their empirical study they found that 10.42% of behavioural variance was due to person, 7.29% due to situations, 19.53% due to responses and simple interactions like interactions of subjects with the situation and the interaction of situation with modes of response accounted for 30% of behavioural variance. From this empirical study they concluded that there is no single major source of behavioural variance, at least so far as the trait of anxiousness is concerned. Human behaviour is complex. In order to describe it, one must take into account not only the main sources of variance (subjects, situations and modes of response) but also the various simple interaction (subjects with situations, subjects with modes of response, and situations with modes of response) and, where feasible, the triple interaction of subject with situations and modes of response. Behaviour is a function of all of these factors in consideration.

Similar results were reported by Endler and Hunt (1968, 1969) in their studies of anxiousness and hostility. On the basis of summaries of empirical studies on trans-situational consistency of behaviour, comprehensive discussions of modern interactionism have been provided by Pervin (1968), Argyle and Little (1972), Bowers (1973), Mischel (1973a, 1973b) Endler (1973, 1975b) and Ekehammar (1974). Mischel has moved from a situationistic view point in his earlier discussions (1968, 1969) to a clear interaction position (1973a). Sherif and Sherif (1969) in their discussion of social interaction, Carson (1969) in his development of Sullivan's interpersonal theory, Jones and Nisbett (1971) in their review of the literature on person perception, and Olweus (1973) discussing his research on aggression all operate within an interactionistic framework. Recent discussion of the person by situation interaction issue have also been provided by Wallace (1967), Block (1968), Magnus-

son and Heffler (1969), Vale and Vale (1969), Goldfried and Kent (1972) and Krasner and Ullmann (1973).

Endler and Magnusson (1976), and Magnusson and Endler (1977) have outlined the basic elements of the modern interactionistic model. According to them, a basic element in interactionistic model is the focus on the ongoing multi-directional interaction between an individual and his or her environment, especially the situation in which behaviour occurs. Persons and situations are regarded as indispensably linked to one another during the process of interaction. Neither the person factors nor the situation factors per se determine behaviour in isolation ; it is determined by inseparable person by situation interactions. The basic elements of the person by situation interaction model is summarized by Endler and Magnusson (1976) as follows :

1. Actual behaviour is a function of a continuous process of multidirectional interaction or feedback between the individual and the situations he or she encounters.
2. The individual is an interactional, active agent in this interaction process.
3. On the person side of the interaction, cognitive and motivational factors are essential determinants of behaviour.
4. On the situations side, the psychological meaning of situations for the individual is the important determinant factor.

Endler (1975) defined interactional psychology as the scientific investigation of a complex interplay of situations and persons in determining behaviour. Magnusson and Endler (1977) concluded that the interactionist model forms the basis of an integrated theory of personality in which models of information processing, including cognitive and motivational factors on the persons side and the meaning of situations as whole, as well as within situations components on the situation side are integrated in a personality model that can explain the ongoing process in which individual behaviour occurs.

The concept of interaction discussed here refers to the interaction of independent variables (persons and situations) rather than the interaction between independent and dependent (behaviour) variables. Rather we should examine the effects of person-situation interaction on behaviour and the effect of this behaviour on situational factors.

The person variables may be called intervening variables or hypothetical constructs. According to Magnusson and Endler (1977) they can be classified in terms of (a) structural variables—characteristic properties of the mediating system (e.g. intelligence, cognitive complexity); (b) content variables—situationally determined or stored information (e.g. content of anxiety arousing situations), and (c) motivational variables—the arousing directing and maintaining forces of the processes, indicating why the individual selects and treats information and reacts as he or she does (e.g. values, drives, needs, motives). Reaction variables, in contrast, can be classified in terms of (a) covert behaviour, (b) covert reactions (feelings etc.), (c) physiological reaction, (d) artificial behaviour (test behaviour, role as specified variable). Situational factors may be viewed from these angles. One important distinction is between (a) the situation as a whole, and (b) the various elements or situational clues within a situation (Magnusson 1975, 1976).

The term 'Interaction' has been used in two different ways in interactional psychology: (a) statistical interaction and (b) dynamic interaction. Statistical interaction refers to interactions of main factors, such as situations, person and modes of responses (reaction) within a data matrix. According to Magnusson and Endler (1977) such kind of interaction has four different sub-categories :

1. The rank orders of individuals may differ for various kinds of reactions within a specific situation. In statistical terms there will be a significant interaction between individual and modes of responses (kind of reactions).
2. The rank orders of individuals may differ across situations for a specific mode of response. In statistical terms there will be a significant interaction between individuals and situations
3. The rank orders of situations may differ across various kinds of reactions for a specific individuals (or group of individuals). In statistical terms there will be an interaction between situations and modes of response.
4. In a three-way matrix of data for individuals—reaction modes of response, and situations—there may be significant three way interactions.

The above kind of interaction have been empirically tested by Raush, Dittman and Taylor (1959), Endler and Hunt (1966),

Berkowetz and Green (1967), Moos (1968), Sandel (1968), Endler and Hunt (1969), Nelson, Grinder and Mutterer (1969), Bishop and Will (1970) and Fieder (1971).

'Dynamic interaction' refers to a model of behaviour in which person mediating variables, person reaction variables, and situations (environments) are integrated in order to describe and explain the process whereby individual behaviour develops and maintains itself. There are two kinds of dynamic interactions namely, within situation interaction, and between (across) situations interaction (Magnusson, 1976 a).

Magnusson and Endler (1977) have explained within-situation interaction in the following manner. Within the frame of reference provided by a particular situation, the situational cues continuously change, partly as a function of the behaviour of the individual. At any moment the individual selects, interprets, and treats the situational information and transforms it into behaviour, which in the next stage of the process, becomes an important part of the situational information for the individual. Simultaneously, this affect the behaviour of others and thereby contributes to providing changes in the situation. Studies of dynamic transactions by Raush (1977), Peterson (1977), Golding (1977) and Fisk (1977) are representative of such kind of interaction.

Dynamic interaction between individuals and situations includes the kind of interaction process that occurs when an individual appears in a number of different situations. This kind of interaction is hereby denoted as temporal or between (across) situation interaction. Alker (1977), Pervin (1977), and Wachtel (1977) studied the person by situation interactions between (across) situations. Study of such kind of temporal interaction will be more fruitful by making observations of individuals over long periods of time (longitudinal studies). Importance of longitudinal (follow up) studies has been emphasized by Block (1971, 1977), Magnusson, Duner and Zetterblom (1975), Alker (1977), Epstein (1977), Sarason (1977) and Wachtel (1977).

The concepts like trait-state distinction drawn by Zuckerman and Mill Storm (1977), Locus of Control as developed by Rotter (1966, 1977) and Lef. Court (1972, 1976) are in line with the approach to the interactional psychology. Similarly, based upon the interactionism paradigm, Endler (1975, 1980, 1983) developed the person by situation interaction model of anxiety. Recent develop-

ment of interactionism have centred on the role of persons in selecting, evoking, cognitive restructuring and manipulating features of their environment. Such studies have been carried out by Scar and Mc. Carthey (1983), Buss (1987), Swan et al (1989), Hettrema (1989), Caspi and Bem (1990), Caspi and Herbner (1990), Henrick et al (1990) and Van Heck (1990).

Mehodology for Analysing Person Situation Interaction

Most of the empirical studies on the person by situation interaction adopt either of the following two methodologies of data collections and measurement. These are: (a) correlational approach and (b) variance component approach. According to the correlational approach, relative consistency hypothesis of behaviour is tested directly by correlations of an individual's behaviour across situations in a search for stable rank orders. As it has been discussed earlier that consistency of behaviour is an important construction in interactional psychology. If an individual displays a certain type of behaviour to some extent across situations, then his behaviour excludes absolute consistency. On the other hand, if the rank order of a set of individuals with respect to a specified behaviour is stable across situations, then such kind of consistency is called relative consistency. Magnusson and Endler (1977) are of the opinion that his kind of relative consistency has been examined in most of the empirical studies relevant to the person by situation interaction. Relative consistency is investigated by carrying out test-retests reliability of self-report data through questionnaires which exposes events, covert and physiological reaction (behaviour) variables.

The test-retest reliability is most appropriate for testing the relative consistency hypothesis of reactions variables at two different points of time. Hence a follow-up (longitudinal) study requires such kind of methodology. Mayers et al (1988) have recently carried out a 18 months prospective study of reaction variable as captured by self-report questionnaires like 16 PF and CPQ (Children's personality questionnaire).

Another corollary of the correlational approach in a follow up (longitudinal) study is finding out any significant change in the reaction variables as captured by self-report questionnaires over a

period of time. The 'variance components' approach is developed by Endler and Hunt (1966) in which the relative proportion of variances caused by individuals, situations, responses, and their interactions within a person \times reaction \times situation data matrix. As one main problem of interest in interactional psychology is to find the relative contribution of different sources (Person factors, situational factors and response modes) to the total behavioural variance, this approach is the most important methodology in interactionism. Endler and Hunt (1966) used a three way analysis of variance in accordance with the three way division of data-person, situations and modes of responses. The mean squares generated from analysis of variance can be broken down into different component of variance as suggested by Shultz (1955), Edwards (1960) and Gaito (1960) in terms of mean squares.

Sports Personology: Importance in Interactionism Paradigm

Sports is generally understood as competitive physical activities having elements of play, games and contest. From this perspective Mcpherson, Curtis and Loy (1979) defines sports "as a structured, goal-oriented, competitive contest based, ludic physical activity." The fundamental feature of sports is that it is structured physical activity in a sense that most of the sports are governed by rules and are limited in space and time.

The second characteristics of sports is its orientation. All forms of sports involve achievement and goal-oriented behaviour, which has its manifestation in athletes and team having their individual and team goals and a variety of standards of excellence. The third aspect of definition of sports is that sports is competitive. Competition may involve one individual against another, a team against an opposing team, one team member against other team members, one individual or team member against some standard.

Sports psychology is the scientific enquiry into various psychological factors that influence diverse aspect of sports and physical activity as embodied in its above definition of sports (Silva and Weingberg, 1984). Sports psychology has emerged as a legitimate field of scientific enquiry since the late 1960's. Sport psychologists have persuaded the basic rules of science, i.e., the observance of the events, the description of phenomena, the explanation of factors

that influence events in systematic manners, the prediction of events and outcomes based upon reliable systematic explanation and ultimately the control of events which results in expected outcomes.

Psychological Variables and Sports Performance

During the late 1960's and 1970's sports psychologists examined such concerns as the personality trait differences between athletes and nonathletes, successful and less successful athletes, playing one position vs. another, athletes participating in team and individual games and male and female athletes.

The early literature in sports personology tried to find out personality profiles which are generally associated with specific games.

Towards the later part of 1960's and early 1970's sports psychologists were searching for accurate and definite answers to legitimate questions like "what are the truly and relatively enduring personality characteristics within traits that can have powerful effects upon how athletes perceive situation, and how they act in these situations."

The third and most important direction of research is the interactionist view of personality and behaviour in sports (Silva, 1984). As Grossarth et al (1990) say "personality may be more of a moderator variable than a direct predictor of sport-related behaviour and thus its force depends upon a wide range of other variables being present and specified." Finally, in order to predict athletes' success, personality trait data have been combined with physiological characteristics, a practice long carried out in Eastern Europe. In this way the predictive value of personality test data alone, which has tended to be low and not very useful, has been enhanced so that some useful predictions of athletic success have been forthcoming (Morgan, 1974). Carried to their extreme, however, such studies would gather performance data highly specific to the sport itself and thus would end up predicting that success in a sport was indeed predicted performance in that sport (Cratty, 1989).

Personality Factors and Sports Performance : Some Theoretical Constructs

The role of personality and other related variables in sports performance has interested sports psychologists for decades. Many individuals involved in sports environment have written and spoken

about born winners and born losers. Because of the individual differences between high level and low level performers, one actually becomes interested in exactly the factors or dimensions underlying an outstanding athletic performance.

According to Alderman (1974) athletic performance is mainly dependant on four major groups of factors : (1) natural ability, capacity, and the physical endowment an individual receives via genetic inheritance, (2) the acquisition of the specific skills required for excellence in a particular sport, (3) the specific type and level of physical fitness mandatory for that sport, and (4) the general socio-psychological make-up of the person in terms of his social attributes, personality factors, motivational and emotional strengths. He further contends that all motor performance, regardless of a person's ability level, is a function of the "meshing" of these four dimensions. These factors, and the performances resulting from an interaction of them, are also definitely influenced by the general environment in which the person lives and the specific conditions under which the situation is occurring.

According to Silva and Weinberg (1984), various sports place specific demands on the athlete. Moreover, the interactionist model of personality emphasizes an individual's social learning in particular situations providing for behavioural diversity. Hence, these authors are of the opinion that some diversification as well as some homogeneity in personality characteristics would seem useful for predicting behaviour with respect to specific sport. This model is illustrated in the following pyramid :

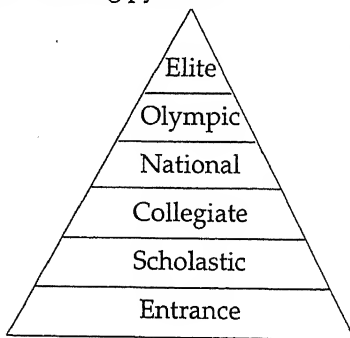


Figure : Personality-Performance Pyramid

The pyramid provides quite comparable view of personality and performance. At the entrance level, there may be greatest

amount of heterogeneity in personality characteristics even within the same sport. Through exposition of athletes to the psychological and other demands, some find that particular traits enhance their ability to perform while other traits may impede it. Therefore, in moving up the pyramid competitive ladder, one would expect more homogeneity in the personality of participants.

A corollary of the personality-performance pyramid is that common characteristics of elite athletes in one sport may differ from those elite athletes in another sport who are challenged by a different sports-specific situations. While recognising the situational specificity, the model allows for investigators to determine if any factors are common components for success across various sports.

Silva and Weinbers (1984) further emphasise the importance of a multivariate approach to the study of sports performance in which physiological, psychological and motoric components appropriate for a sport may be combined together.

Personality Changes and Follow-up Studies

There are several models which try to explain the underlying personality changes due to persistent participation in competitive sports. These are : (a) the attrition model, (b) the selection model, and (c) the change model.

The attrition hypothesis is popularized by Kroll (1970). According to this hypothesis, children and youth with less optimal personality traits tend to drop out of competition. Those who remain in competition, project a different profile than do those who originally entered the sport. Cox (1986) alternatively calls this hypothesis "the survival of the fittest" or "the Darwinian" approach. Silva (1984) employs this hypothesis to explain the variability of the personality characteristics at the entrance level and commonality at the elite level. He explains that no common personality characteristic existed initially, but through modification (learning) and attrition, athletes with adoptable or suitable characteristics persist in competitive sports. Hence, novice players would appear to be dissimilar whereas veteran players would be similar.

The second hypothesis regarding personality change and athletic participation is that only those, with certain personal predispositions, will enter a sport in the first place. Orlick (1972) reported

that he could predict with high accuracy which boys would enter ice hockey competition after surveying the social context and attitude surrounding them about the age of 8 years. Singer (1974) found that at 12 years of age the competitive group was already high on the extraversion scale. He speculated that perhaps the competitive environment might have been more attractive to boys who were high on the extraversion scale. This hypothesis is called the selection hypothesis.

The third model states that sports participation truly changes the basic ways in which an individual behaves and feels. To bolster this change model, one must produce longitudinal data from the same participants and document intra individual modification in personality trait scores. The basic concept underlying the change model is the social learning theory as developed by Rotter (1954), and Mischel (1973). Mischel (1977) has stated that "the image is one the human being as an active, aware, problem solver, capable of profiting from innumerable range of experience and cognitive capacities, possessed of great potential for good or ill, actively constructing his or her psychological world, interpreting and processing information in potentially creative ways, influencing the world but also being influenced by it faithfully." The social learning perspective is compatible with the view that human beings are constant observers and learners, always changing, adapting to new circumstances and settings.

Echoing the behaviourist and social learning theorists, Alderman (1974) illustrated the underlying factors of personality change in sports context. He is of the opinion that children participating in sport will acquire certain behavioural patterns specific to sports setting they encounter if the reinforcement contingencies are strong and consistent enough to condition certain responses. Certain personality traits can be learned while participating in sports competitions. This view of Alderman is supported by Cratty (1989) who identified heightened social status and visibility as positive reinforcement contingencies to increase self-respect of sportspersons.

A second explanation might be the physiological bio-chemical parameters *per se*. This assumption postulates that the intense exercise to which many athletes are exposed results in both temporary and permanent mood changes — positive variation in feeling that will be reflected in personality.

Sports psychologists, sports administrators and coaches involved in competitive sports have always emphasized the view that participation in sports will have beneficial influence on the development of personality—Johnson (1966), Ogilvie and Tutko (1966), Clark (1967), Slusher (1967), Talbot (1967), Olwin (1969) and Berger (1970).

Layman (1972) came out with the following propositions which outlined the possible causes underlying changes in behaviour which take place due to participation in sport activities :

1. Engaging in sports promotes physical fitness. Fitness is associated with good emotional health and a lack of fitness with poor emotional health.
2. The acquisition of motor skills involved in sports contributes towards meeting the basic needs of safety and esteem in young children of both sexes and in boys and young men from the early grades through the college years.
3. Participation in play and sports present potentialities for promoting emotional health and preventing delinquencies.
4. Clinical evidence from play therapy, group therapy and the use of physical exercise as psychiatric adjustment in the emotionally ill patients indicates that when play, recreational and athletic activities are planned with individual needs in mind, they may be very valuable means of improving emotional health.
5. Play and sports supply outlets for the expression of emotion, and outward expression of emotion in approved activities is conducive to the development and maintenance of emotional health.
6. Competitive sports, if properly used, may enhance emotional health and the acquisition of desirable personality traits.

Synder and Spreitzer (1973), Orwin (1973), Morgan (1973), Larson (1976), Zaichkowsky and Smith (1978), Bucher (1979), and Buffone (1980) subscribed to the views expressed by Layman. Griest et al (1978) have identified a number of factors that may help explain why vigorous physical activity is associated with reduction of depression. These factors include: mastery, patience, capacity for change, distraction, positive habit, symptom relief and biochemical changes that accompany the activity.

Dienstbier (1984) has proposed three possible mechanisms : (a) physiological changes, for personality change as function of sport and exercise (b) socialising and life style changes and (c) expectation and value changes as function of sports and exercise. This is broadly in agreement with the postulates of Layman (1972).

Interactionist Studies in Sports Psychology

The emerging field of sport psychology has gone through various stages of enquiring into personality. The person-situation debate has raged in the sport psychology literature {Rushall (1972), Martens (1975), Fisher (1978, 1984), Monga (1980 a, 1980 b), Carron (1980) and Silva (1984)}. In a content analysis and review of the sport personology literature between 1950 and 1973, Martens (1975) concluded that most of the sports personology literature embarked upon a trait prospective. Martens further concluded that the interactional paradigm was the direction sports personality research should take.

The interactional paradigm in sports psychology has taken the form of three approaches :

- (a) The cognitive approach,
- (b) The trait-state approach and
- (c) The interactionist approach (Vealey, 1989).

The cognitive approach in sport personality defines the field as the way people perceive and interpret the environment, the way these perceptions and interpretations influence subsequent behaviour. Fisher (1976) states that the cognitive model of psychology should be more efficacious for sportspersonality research because it allows the sport performance to interpret the situation in conjunction with self.

The applied sport psychologists have taken help of the cognitive approach to develop a model of self regulation in sports. Regulating one's goal directed behaviour involves a variety of complex interactions between cognition (planning, goal setting), affect (emotional states), and environmental constraints (Kirshchenbaum and Wiltr-ock, 1984). Researchers have tried to organize these complex interactions by describing them as sequences or phases.

Based on the cognitive approach and self-regulation model, a variety of techniques have been developed which can affect sports

performance. These studies have examined techniques including positive self expectancy enhancement, bio-feed back, dissociation and psyching up (Weinberg and Genuchi, 1980).

Though cognitive approach falls under the broad category of interactionist approach, it has somewhat a distinctive feature than the interactional approach as outlined by Endler and Magnusson (1976) and Magnusson and Endler (1977).

The trait-state category represents an interactionist approach in which personality constructs are divided into cross situational dispositions (traits) and specific situational manifestations (states). In this approach, sports behaviour is theorized to be best predicted by personality states that result from the interaction of personality dispositions (traits) and specific situational influences (Vealey, 1989).

Silva and Weinburg (1984) states : someone's emotional response to a situation is often called affect. Just as enduring characteristics or traits interact with the environment, affect also has a role in sport performance. A-trait predisposes an individual to exhibit or state an affective response in given situation. An athlete with poor emotional control will exhibit anger, and be frustrating and upset in more situations than will a person with good emotional control. Once a person experiences (overtly or covertly) a particular affect, his psychological state can influence subsequent performances.

Martens (1975) was an early advocate of the interactionist perspective in sport psychology. He subsequently developed sport specific measures such as the Sport Competition Anxiety Test (SCAT) in an attempt to detect situational variables in competition that may be anxiety provoking (Martens, 1977 ; and Martens et al 1982).

Morgan (1980 a) has advanced what is essentially an interactional position by advocating the combination of state and trait testing when conducting personality research in sport. By measuring states, the researcher is examining the psychological responses a subject exhibit in a specific situation (usually precompetitive period). The measurement of traits indicate one's dispositional tendencies to behave in a certain manner in various situations. Thus by using these informations, a researcher will not only enhance the understanding of how personality variables influence performance but will also get an indication of whether an athlete

is responding to competition in a manner consistent with his or her trait profile or, instead, a manner that would indicate situational constraints (Silva and Weinber, 1984).

Fridhandler (1986) outlines four dimensions that define the distinguishing aspects of trait and state concepts. These two concepts are distinguishable from each other on continuous versus reactive manifestation, concreteness versus abstractness, and situational causality versus personal causality. For example, competitive trait anxiety would be viewed as enduring overtime, reactive only to relevant circumstances, abstract in that it must be inferred and representative of behaviours that emanate from within the individual. On the other hand competitive state anxiety would be viewed as short lived occurrence, manifested continuously in reaction to relevant situations, directly detectable and the result of immediate situational factors.

The S.R. inventory approach introduced by Endler, Hunt and Rosentien (1962) examined the effect of both different situations and people's personal means of responding to express a particular personality characteristic. As Fisher (1984) states, the task of sportpersonality researchers is to construct the meaningful sport situations from the environment that interact them and then get athletes to respond to these situations with a variety of personality indicants. The situations must be representative of the sport environment in question, and the response modes must be congruent with the personality dimension under study.

Kroll (1979) has suggested that scales such as the TMAS, STAI and even SCAT are capable of assessing the presence of anxiety but not causes while the SR-CTT assess A-trait in response to five general situations, these situations may or may not be construed by athletes to be present in all sport settings. Kroll (1979) has attempted to solve these limitations by asking large number of athletes what makes them anxious before competition. His screening identified 125 frequently voiced items forming five major clusters. These are somatic complaints, fear of failure, feelings of inadequacy, loss of control and guilt.

Fisher (1979) and Fisher and Zwart (1982) used an approach similar to Kroll and employed the model of Endler, Hunt and Rosenten (1962) with 13 anxiety eliciting situations specific to basketball. Athletes noted the extent of their anxiety responses to these situations. The situations deal with pregame, game and

postgame circumstances and were designed to elicit varying degree of anxiety responses. Essentially, three dimensions of anxiety reflecting to trait differences were revealed : ego threat, outcome uncertainty/certainty and anticipation (Anxiety fostered by pending situations). Similarly, Cratty and Hanin (1980) has employed the strategy developed by Kroll (1979).

The situation-specific approach has also been used in combination with perceived physiological states. Harsfall, Fisher and Morris (1975) have asked athletes what signs of anxiety (dry mouth, shortness of breath, and so forth) are likely to appear when they confront specific situation in sport.

Fisher (1984) has suggested that a true interactionist measurement model for sport persons may be constructed by modifying the California Q-set (CQ-set) test as developed by Block (1978). He suggested that the 100 items in this test may be modified to describe sport-specific situations. The athletes may be asked to sort the personality descriptor of the CQ-set according to how well each trait is characteristic or salient of the self in the particular sport environment of interest. To the degree that the athlete can capture the issuance of sports demands in his/her mind while self-sorting the data will represent person situation interaction.

Need of the Study

Sport psychologists have debated over which personality paradigm is the most efficacious approach to understand and predict behaviour in sports. A paradigm is an accepted scientific practice that becomes a model for subsequent scientific enquiry in a particular area. Clearly, the adoption of a particular paradigm is the most critical feature of research. The paradigm defines the way in which the research question is addressed and pursued.

In an attempt to resolve the dilemma arising out of research in sportpersonology, psychologists have begun to seriously examine alternative models. Comparative static analysis of personality structures subject to sports environment is a good step forward. The implicit assumption in such analysis is incipient interactional paradigm. The dynamics of personality and the development and modification of personality are important aspects of such theoretical models. It is worthwhile to study young sport persons as they are put in competitive environment for a period of time and

note the changes that has taken place in their personality pattern during their formative years. Such studies are rare in sport psychology where time has taken as an independent variable.

The dynamic aspect of interaction between individual and situation includes the kind of interaction process that occurs when an individual appears in a number of different situations. The sequence of the situations may be such that the temporal interaction will be more fruitful by making observation of an individual over long periods of time. Importance of follow-up studies have been emphasized by Block (1971, 1977), Magnusson, Duner and Zetherblom (1975), Alker (1977), Espstein (1977), Sarason (1977) and Wachtel (1977).

Follow-up studies have been emphasized by trait psychologists also. Kagan and Moss (1962) from their longitudinal studies of adolescents found that apparently discontinuous segment of behaviour were later shown to be comparatively stable if they are subduced under a single concept that is masculinity. The boys' behaviour patterns tend to show greater fluctuations than the girls. Bayley and Schefer (1960) found evidence for both consistency and change in overt behaviour. The studies by Emerick (1964), Bloom (1964), and Burt (1965) emphasized follow up studies during adolescent days to test stability or relative consistency of overt and covert behaviour during the formative years. Eysenck (1965) found that the anxiety (neuroticism) scores tend to show a slow decline with increasing age. His views that participation in competitive sport will have a beneficial influence on the development of personality have been supported by Cagigal (1965), Johnson (1966), Ogilvie and Tutko (1966), Clark (1967), Slusher (1967), Talbot (1967), Colwine (1969), Berger (1970), La Cara (1970) and Johnson (1974). Phares (1976) indicates that interactional model, which evolved from social learning theory, recognizes that human behaviour is changeable even though new experiences are significantly influenced by the accumulation of knowledge from past experience.

It has been conclusively held by Seefeldt and Gould (1980), Folkins and Sine (1981), and Tucker (1983) that persistence in physical activity within competitive sports environment over a period of time results in a number of positive changes in the behaviour of the participants engaged in such activities.

Johnson and Koshes (1985) concluded that exercise and sport decreases depression and anxiety and contributes to a sense of well being. Longitudinal studies by Doyne et al (1987), Thill (1988), Joan et al (1988) confirmed above kind of findings.

In view of the above theoretical and empirical findings, longitudinal studies are quite crucial for studying behavioural change in competitive sports environment. Holzman (1979) has outlined the difficulties associated with pretty long longitudinal (follow up) studies, some of which are : the investigation may outlive the investigator, new methods of observation and measurement render obsolete those decided upon earlier and measuring instruments adopted for one age range may be unsuitable for another. In view of this follow up studies should embark upon a short term perspective study involving two to three years.

Until recently coaches and sports administrators were paying inadequate attention to social and psychological factors which contribute to sports performance. However, since the early 1980's, there has been an ever-increasing demand by both coaches and athletes for more professional service from sports scientists in the areas of exercise physiology, bio-mechanics, sports psychology, sports administration and skill instruction. The dominant theme of sports psychology revolves around the human development of sportspersons. Danish and Hale emphasises the human development of sportsperson as containing two aspects (Khan, 1988):

- (a) The individual sports persons is an integrated biopsychosocial unit ; and
- (b) Individuals are viewed as developing in a changing biocultural context.

Hence sports administrators and coaches do give emphasis on the psycho-social development of sportspersons while giving training or preparing for future high-competitive matches. Under those circumstances, it is worthwhile to study the changes taking place in the psychological attributes of sportspersons over the designated period of time. This provides insight into the efficacy the psychological preparations and training imparted to sportspersons.

The present study in the first stage, proposes to analyze the influence of sport environment on personality and behaviour. For

this purpose, it is proposed that the most interactive stage of personality is the adolescent days. The young person is influenced more by sports environment and hence his behaviour and personality are too influenced. Young sportpersons chosen by the Sports Authority of India are put in specified schools where they are subject to training in sports discipline and competitive participation. It is worthwhile to study the perceptible changes in personality after a considerable time gap of 18 months.

Secondly, at more advanced level a true person situation interaction model is proposed to be tested at a point of time. For this purpose the modification of the California-set test (Block 1978) is proposed to be carried out so as to bring out the person situation interaction to the fore. Another alternative to the static trait models is the interactional perspective in its true form as outlined by Endler and Magnusson (1976) and Magnusson and Endler (1977).

Objectives of the Study

The present study has the following objectives in view :

1. To find out the significant differences on the 14 psychological factors of sportpersons on the basis of sex, game, and type of games (individual and team games) at a point of time.
2. To find out the significant difference on the psychological factor of non-sportpersons as well as the entire sample of subjects on the basis of sex at point of time.
3. To compare the psychological factor scores of sportpersons with non-sportpersons at a point of time.
4. To find out whether the changes in the scores on the psychological factors of sportpersons non-sportpersons and the entire sample of subjects are significant over a period of time.
5. To find out whether the changes in the levels of performance of sportpersons over a period of time are significant or not.
6. To find out the relative contribution of persons, situations and person x situation interaction to the total variance of psychological variables.

Hypotheses

In view of the above mentioned objectives and theoretical background and studies reviewed, the following hypotheses have been framed :

1. There are significant differences between the male and female sportspersons on the fourteen psychological variables as per CPQ.
2. There are no significant differences between the sportspersons playing different games as compared to sportspersons as a group on the fourteen psychological factors of CPQ.
3. There are no significant differences between the sportspersons playing team and individual games on the fourteen psychological factors of CPQ.
4. There are significant differences between the male and female non-sportspersons on the fourteen psychological variables as per CPQ.
5. There are significant differences between the male and female subjects on the fourteen psychological factors of CPQ.
6. There are no significant differences between the sportspersons and nonsportspersons on the fourteen psychological factors of CPQ.
7. There are significant differences between the initial and final scores on the fourteen psychological factors of sportspersons.
8. There are significant differences between the initial and final scores on the fourteen psychological factors of male sportspersons.
9. There are significant differences between the initial and final scores on the fourteen psychological factors of the female sportspersons.
10. There are significant differences between the initial and final scores on the fourteen psychological factors of sportspersons playing different games.

11. There are significant differences between the initial and final scores on the fourteen psychological factors of sportspersons playing individual games.
12. There are significant differences between the initial and final scores of sportspersons playing team games on the fourteen psychological factors.
13. There are no significant differences between the initial and final scores of non-sports persons as well as male and female non-sports persons on the fourteen psychological factors
14. There are no significant differences between the initial and final scores of the subjects as well as the male and female subjects on the fourteen psychological factors.
15. There are no significant differences between the initial and final levels of performance of sportspersons.
16. There are significant differences between the initial and final level of performance of male as well as female sportspersons.
17. There are no significant differences between the initial and final level of performance of sportspersons playing different games.
18. There are no significant differences between the initial and final levels of performance of sportspersons playing individual games as well as sportspersons playing team games.
19. Persons as well as situations account for significantly to the total variance of 13 psychological variables.
20. There is significant interaction between individuals and situations or in other words, person-situation interaction does account for significantly to the total variance of the thirteen psychological variables.
21. The contribution of person-situation interaction to the total variance is larger than the contribution of either by persons or by situations.

Sports Personology : Empirical Findings

In an interactionist model of personality both the person and situational factors and, their interaction are important determinants of behaviour. The underlying personality structure or psychological characteristics of individuals do matter in an interactionist model.

In this chapter, a brief review of studies pertaining to: (a) personality profiles of sportspersons, (b) relationship of personality factors and performance in sports and (c) follow-up studies in sports setting and personality changes thereof is presented.

Athletes and Non-athletes

Kroll and Carlson (1967) and Coopar (1969) contend that there is possibility that some discrete set of personality factors exists which is related to causing some people to select and participate in sport. Such factors related to participation in competitive sports may well be different from the general psychological needs as related to ordinary physical activity. Alderman (1974) identified sociability, dominance, extraversion, positive self-concept, mental toughness, emotional stability and conventionality as significantly discriminating personality factors of athletes as compared to non-athletes.

Personality Characteristics of Outstanding Sportspersons

In order to delineate the psychological characteristics predictive of sports performance, sports psychologists have tried to find out the

personality characteristics of outstanding performers. In their classic study Johnson, Hutton and Johnson (1954) used the Roscehart Ink-blot Test and House-Tree-Person (H-T-P) test to evaluate personality traits of twelve National Champions of all American athletes. These athletes were able to achieve an exceptional level of concentration on desired goals. The champions were aggressive, highly anxious, and demonstrated high levels of intellectual aspiration and exceptional feelings of self-assurance. Biddulph (1954) also found differences between superior athletic groups and less skilled groups. The superior athletes showed higher levels of personal and social adjustments. Such distinctive psychological characteristics of successful or high performers have been validated by studies conducted in different countries and at different points of time. Studies by Kroll and Carlson (1967), Morgan (1968), Helmet (1972), William (1978) and Morgan (1982) provide such empirical support.

Studies on Indian athletes by Singh (1986), Landers (1986), Somalingham and Ravi Chandran (1986), Bhullar (1981), Dureha (1991), Nangia (1991), Mathew and Mathew (1991), Shergill (1991), Sangwan (1991), Sharma and Shukla (1991) and Somalingham (1991) also support such a concept empirically.

Some of the distinctive characteristics of outstanding sportspersons as empirical studies have shown may be summarised as : Extraversion, Emotional Stability, Straight forwardness, Tough minded, Realistic, Sociable; Confident, Practical, Self-reliant, High Self Esteem, Achievement Motivation, Venturesome, Aggressive and Group dependent.

However, research has been conducted in detail to find out particular dimensions of personality rather than the overall personality of outstanding sportspersons. The dimensions studied are : Extraversion, Emotional stability, Neuroticism, Dominance and Aggression, Selfconcept, Mental toughness and Sociability.

Extraversion

Extraversion is a construct evolving out of Jung's (1933) early designation of the two major attitudes of personality : the extraverted attitude, which orients the person to the external objective world, and the introverted attitude, which orients one toward the inner, subjective world. Eysenck (1965), whose development of the

two broad personality dimensions of neuroticism-stability and extraversion-introversion provides the major underlying theoretical structure of this trait, describes extraverted individuals as out-going, impulsive, uninhibited, involved in groups activities, sociable, friendly, craving excitement, and having many social contacts. They stick their necks out and take chances, act on the spur of the moment, are optimistic, aggressive, lose their temper easily, and are unable to keep their feelings under control.

It has been normally postulated that athletes are more extrovert than nonathletes. This postulation has been empirically validated by studies conducted on different category of athletes belonging to different cultures, games, sex and at different points of time. The studies by Kane (1970), Ikegami (1970), Kroll (1970), William et al (1970), Golas (1971), Oglivie (1971), Morgan and Constill (1972), Hardman (1972), Eysenck (1965), Yeater (1977), Eysenck et al (1981), Eysenck et al (1982), Kirkcaldy (1982, 1984), Diano (1985), Gill et al (1990) and Garland and Berry (1990) support such postulate with respect to athletes belonging to countries other than India. This postulation draws its support with respect to Indian athletes from studies by Mohan et al (1979), Kamlesh (1984), Shankar (1986), Shukla (1986), Kumar and Thakur (1986), Singh and Singh (1986), Singh (1986), Dureha (1987) and Singh (1982).

Emotional Stability and Neuroticism

One consistent finding throughout the sports psychology literature has been the observation that athletes tend to be more normal on the neuroticism-stability dimension of personality. Emotional stability in athletes is characterized as personal integration or a mature control of one's emotions. Normality with respect to neuroticism refers to the lower levels of anxiety.

Consistent findings by Bird (1970), Kane (1970), Ikegami (1970), Yanada and Hirata (1970), Kroll (1970), Ogilive (1971), Morgan and Constill (1972), Morgan (1972), and Hardman (1973) support the view that sportspersons are emotionally more stable and exhibit lower levels of anxiety as compared to non-sportspersons. Further studies by Kirkcaldy (1982), Csikszentmihaytle (1982), Richardson (1984), Eysenck (1982), Costa (1984), Silva et al (1984), Best (1985), Magni (1985), Kollarick (1988) and Garland and Berry (1990) support this view with respect

to athletes belonging to other countries than India. This postulation of emotional stability and neuroticism normality has been validated in case of Indian athletes in studies by Kamlesh (1984), Singh (1985), Kumar and Thakur (1986), Sharma and Shukla (1986), Dureha (1987), Yadav (1992) and Singh (1992). However, studies by Johnson and Cofer (1974) and Martens (1975) failed to concur with the above findings and concluded that there were no consistent differences in A-trait among participants when compared with non-participants.

Dominance and Aggression

Alderman's (1974) review of literature in sport personology showed that dominance and competitive aggressiveness were significantly and consistently found with athletes compared to non-athletes. These studies have found that athletes are characterized by dominance in their life situations and further they exhibit dominance in competitive sport. According to Alderman (1974) dominance is defined as self-assertiveness, self-assurance, toughness, hardness, unconventionality, and competitive aggressiveness. Dominance is strongly linked to need for power which is characterized by the desire to influence or control of other people. Dominance in athletes is also characterized by self-confidence, boasting, conceit, vigor, egoism, and a tendency to extra-punitiveness. According to Cratty (1975) in many sports, particularly those that condone contact, various forms of control, physical aggression are primary requisites. Studies by Kane (1970), Bird (1970), Mushier (1970), Hardman (1973), and Sack (1975) have reported that athletes could be differentiated from non-athletes with respect to their dominance and competitive aggressiveness. Studies of Slepicka (1975), William (1978), Dowd and Innes (1982), Ammodt et al (1982), Keules (1983), Kollarick (1988), Dodg and Coie (1987), Toddy and Cosmides (1990), Buss (1991), Mc. Gowan and Miller (1989), Thorton (1990) and Garland et al (1990) support the above findings.

Thakur and Thakur (1980) studied personality characteristics of athlete and non-athlete Indian College males using projective method of personality assessment and found that characteristics significantly associated with the athletes were dominance and superior organisation capacity alongwith other factors. Studies by

Thakur and Ojha (1981) and Sharma and Shukla (1986) support that Indian athletes do exhibit more aggression as compared to non-athletes.

Self-Concept

Self-concept refers to several kinds of identifiable personality traits like self-confidence, self-assurance, self-assertiveness, self-esteem, self-regard, self-consistency, self-enhancement and self-respect. According to Cratty (1975) it is not unreasonable to expect that athletes are generally a self-confident group. The social status accorded to superior athletes performing at all level makes it likely that these individuals exhibit confidence and assurance in social situations. Alderman (1974) concluded that an overwhelming body of research is beginning to appear that consistently indicates a high relationship between the concept an athlete has of himself and his achievement in sports.

Studies by Schendal (1970), Synder and Spretzer (1973), Ibrahim and Morrison (1975), Vincent and Marilyn (1976), Bunnell (1978), Morris et al (1981), Best (1982), and Costa (1984) have supported the above postulate with respect to different category of athletes. Such postulation find validation with respect to Indian athletes in the studies by Rana (1981), Kamlesh (1984), Kumar et al (1985), Sandhu and Brar (1986), Schunnaker et al (1986), Dureha (1987), and Sohi and Omolabi (1991).

Mental Toughness

A mentally tough athlete can take rough handling, is not easily upset about losing, playing badly, or being spoken to harshly ; can accept strong criticism without being hurt, and does not need too much encouragement from his coach. Cattell (1960) described the tough-minded individual as one who is emotionally mature, is independent in action and thought, is hard and realistic in his appraisal of himself and the world, can overrule his feelings and does not show anxiety about events occurring about him. On the other side of the scale is tenderminded individual who is emotionally less mature, impatient, sentimental, gentle and who frequently shows his anxiety.

Tough mindedness has been identified as a personality trait in athletes by Kroll (1967), Bird (1970), Mushier (1970), Kane (1970),

Rush (1972), Helmet (1972), Sack (1975), Gruber and Perkins (1978), Evans and Quartman (1983), Costa (1984) and Garland et al (1990). They have found that athletes are more tough minded than non-athletes. Similar finding have been reported with respect to Indian athletes by Sharma and Shukla (1986).

Sociability

Sociability has been defined as a construct having the following characterization : a sociable person is warm, good natured, easy going, ready to cooperate, attentive to people, soft heart, kindly, trustful, adaptable, and warm-hearted. This factor is similar to Cattell's factor A, that is cyclothymia.

It has been consistently demonstrated by Ikegami (1970), William (1970), Helemet et al (1972), and Chadwick (1972) that athletes tend to be outgoing and socially confident to a significant extent. Slepicka (1975) observed that successful players were more cooperative than the unsuccessful players. Similar results have been found by Evans and Quarterman (1983) with regard to basketball players. Studies on Indian athletes and non-athletes by Thakur and Thakur (1980), Rana (1982), Sharma and Shukla (1986), and Dureha (1986) confirmed the view that sociability is also one of the discriminating personality characteristics between athletes and non-athletes. Best (1985), Kollarik et al (1988) and Garland and Berry (1990) have demonstrated similar kind of finding.

As a summary of the above studies it may be said that a fairly coherent picture of the athletic personality does emerge. Several investigators have consistently demonstrated that sociability, dominance, extraversion, positive self-concept, emotional stability, and mental toughness are important personality characteristics which discriminates athletes from non-athletes. Alderman (1974) reported that, though numerous, other traits have been claimed as representing significant aspects of the athletes' personality, they have not had same kind of consensus as the aforementioned factors. The other traits which have been occasionally reported by investigators to be significantly associated with athletes are conventionality by Kroll and Crenshaw (1970), Helmet et al (1972), Roush (1972), Rana (1982), Dureha (1986) ; intelligence by Bird (1970), Mushier (1970), Acampora (1971), Johnson (1972), Hardman (1973), Thakur and Thakur (1980) ; and competitiveness by

Sharma and Shukla (1986), and Gill et al (1990). However, there is no consistent finding among different investigators and moreover these findings have not been corroborated by repeated studies with respect to different samples spread over several countries.

Distinguishable Psychological Characteristics of High and Low Performers

Sports psychologists have tried to differentiate between superior and inferior performers in various sports. This attempt is closely related to the investigation aimed at finding the psychological qualities of champion athletes. It has often been observed that athletes who have similar physical abilities and skill yet perform at different levels in competitions. The difference between such levels of performance is due to psychological make up of the different competitors.

It has been hypothesised that champion performers score higher with respect to certain psychological variables compared to non-champions or average athletes. However, this postulation, unlike the previous ones we have already discussed has not found universal empirical support. Studies by Acampara (1971), Ogilvie and Tutko (1971), Morgan and Constil (1972), Kane (1971), Morgan (1975), Gooch (1973), Yanada and Hirata (1970), Foster (1972), Shokeen (1977), Groova and Perkin (1978), Singh (1979), Novotony and Petrak (1983), Quarterman (1983), Lide (1986) and Vole and Keil (1987) support the hypothesis. But studies by Morgan (1972), Simson (1975), Thakur and Ojha (1981), Uppal and Singh (1984, 1986) and Dey and Uppal (1986) found no significant difference between the psychological make-up of champion athletes and the nonchampions.

The inconsistency in the findings by research scholars with respect to this postulation is explained by methodological problems (Morgan, 1972). Llewellyn and Blucker (1982) offer the explanation that champions in one country may not be the same in other countries. Similarly the athletic standards of national champions of one country may be significantly different from national champions of other countries.

Psychological Variables and Sports Performance

Alderman in his 1974 review of studies on sportspersonology commented that personality traits like sociability, dominance,

extra-version, positive self-concept, emotional stability and mental toughness are consistently identified as loading on successful athletic performance. However, he further commented that the personality profiles of athletes based on measurements of the personality traits do not increase our knowledge of the dynamic tendencies which move people to action. They do not give us a picture of the 'whole' person but just segments. Little attempt has been made to show how these traits integrated with each other to cause overt behaviour. In order to rectify such inadequacies in sports personality research, attempts have been made to find out direct relationship between personality characteristics and sports performance.

Sports psychologists have attempted to find direct relationships between sports performance and psychological attributes in the following manner :

- (a) Certain psychological attributes are essential to achieve high level sports performance. Certain attributes may be universal and other may be game specific.
- (b) Certain psychological attributes are initially present to enhance performance. However the enhanced performance reinforces such psychological well-being and in future results in further better performance. This is more true in case of psychological concepts like self-esteem.
- (c) The degree of athletic ability is predicted by personality factors.

Though psychological variables are considered as determinants of sports performance to certain extent, reciprocal causality has been emphasized by certain investigators. In a study concerning the impact of high and low performance on the self-concept of athletes, Pate (1973), employing two-way ANOVA observed that winning performance appears to have a significant positive effect on the wrestlers' concept of self. High School wrestlers have a lower level of self concept as a result of low level of wrestling performance, whereas the wrestlers who demonstrate a high level of winning performance appear to have significantly positive self-concept.

Key et al (1973) reported a significant positive relationship between self-concept and sports ability on a sample of high school athletes. The reciprocal causality between self-efficacy and perfor-

mance is based on Bandura's social learning theory. Feltz (1982) more elaborately treated the self-efficacy hypothesis as developed by Bandura. Compared to the previously described studies using a strong inference approach, Feltz's results provided only partial support for self-efficacy theory. In this case parts of self efficacy theory was disapproved and from her findings Feltz proposed a respecified model. In contrast to the hypothesis derived from Bandura's theory, selfefficacy was neither just an effect nor was it the only predictor of performance. The effect of self-efficacy on performance was strong in the first trial, but after trial I, backdiving performance on a previous trial, was the major predictor of performance on the next trial. Although support was demonstrated for Bandura's idea that self-efficacy and performance show reciprocal cause-effect relationship, they were not equally reciprocal. As one's performance improved, performance had a greater influence on self-efficacy than self-efficacy had on back diving performance. The heart rate results only supported the anxiety predictor of performance. The respecified model accounted for more performance variance than did Bandura's Model (Feltz, 1982).

Another area for research is finding the personal performance expectancies of athletes before and after a competitive game. A study by Scanlan et al (1981) revealed that the intra-personal factors of ability and self-esteem were related to personal performance expectancies while competitive trait anxiety was not. The situational factors of past win/loss record and prior game win/loss against the same opponent influence team performance expectancies.

Issac (1981) investigated the relationship between depth perception and basketball shooting performance over a competitive season and no significant relationship was found between any of the measures of depth perception and field goal shooting. However, significant relationship was found between free-throwing and measures of depth perception.

In their highly comprehensive, critical and thoughtful review of the relationship between sports and personality, Eysenck, Neas and Cox (1982) listed a number of important conclusions. Based around his three well defined dimensions of personality—Extraversion, Neuroticism and Psychoticism—a number of findings are apparent : both average and superior sport persons tend to be extraverted because of their higher pain thresholds, sensation-seeking assertiveness, competitiveness and speed of reaction. On

the other hand, sports people tend to be low on neuroticism (with its attendant anxiety) but high on psychoticism because of the aggressiveness, egocentricity and competitiveness associated with rough mindedness. Also body-type (most frequently mesomorphic) is related both to personality and sports performance.

Kane (1980) from his investigations have reported that personality and motor performance in sports are related. But he has reported that the amount of variance in athletic ability that may be predicted by personality testing rarely exceeds 20%. This leaves 80% behaviour variance of athletes apparently dependent on other qualities including the physical attributes. This is the reason why, in recent years, physical and psychological data are combined for explaining more of the behaviour variance among athletic groups.

Riley (1983) studied the inter-relationship between self-concept and physical performance from the perspective of symbolic interaction theory and his findings revealed a significant positive relationship between self-concept and physical performance. Similar views have earlier been echoed by Holman and Parkhouse (1981) from their study of high school athletes and Bredemeir et al (1983) from their study on enhanced inter personal relation as predictor of athletic performance.

Mazurov and Hosek (1984) conducted a study to find out relationship between psychic stage and athlete's performance. According to them the performance of athlete is determined by his psychic state which should be regarded as a total manifestation of man's psyche in a concrete situation. It was verified that the psyche state appeared as a variety of these components: subjective sensation of activity (PT) and mood (ET) as well as level of motivation (PH) as their energetic basis. The measurement of the first two indices is carried out by means of the method of subjective seeking. The last is ascertained through the measurement of galvanic current. It was experimentally sustained that the athlete's performance depended on the introduced components of psychic status.

Zenenbaum and Fraust (1985) from their study of 138 successful and unsuccessful athletes reported that individual athletes assigned unsuccessful sports events more internally than team athletes with a similar tendency found in successful events. Following competition individual sports athletes assigned causes more internally than team athletes. The higher the perceived ability, the

more internal the responsibility for both successful and unsuccessful sports events. Uppal and Singh (1985) saw significantly positive changes occurring in 20 female subjects of 18-21 age group in the self-concept after eight months regular participation in regular physical education programmes.

Vealey (1989) has formulated evaluative tools to measure qualities like confidence and competitiveness in sport. Both their temporary existence and their more permanent place in the athlete's personality play important role in sports performance. Singh and Debnath (1986) studied the competitive performance and self-concept of Indian gymnasts. They found that the better performance group was having higher positive self-concept than the poor performance group.

Iso-Ahola and Blanchard (1986) studied the relationship between psychological momentum and competitive sports performance. They concluded the hypothesis that prior wins provide psychological momentum is correct. They further found that successful performer improves his/her performance, thus increasing the likelihood of future success.

Mohoney et al (1987) conducted a study to assess psychological skills relevant to exceptional athletic performance. A 51 item questionnaire was administered to a sample of 713 male and female athletes from 22 sports. The athlete sample comprised of 126 elite competitors, 141 pre-elite athletes, and 416 non-elite collegiate athletes. 16 leading sports psychologists also completed the questionnaire as they thought the ideal athlete might be omnibus. Individual item, discriminate regression, factor and cluster analysis revealed significant differences among the athletic subsamples. The themes of concentration, anxiety, management, self-confidence, mental preparation and motivation were seen to have potential importance in skill level differentiation, although age difference confounds as well as gender and sport differences may have been involved. The ideal profile constructed by the sports psychologists generally paralleled the skill differences encountered, although the elite athlete did not report selected amplitude in the profile.

Vallerand et al (1988) also studied the relationship between psychological momentum and performance. Their findings revealed that the presence of psychological momentum (PM) pattern led to enhanced psychological momentum perceptions. In addi-

tion, both the scene configuration and the experience variables led to inferences that the player having PM should win the first set and there were some limited indications that such inferences generalized to winning the match. Davies (1989) highlighted the importance of extraversion and neuroticism in predicting and explaining sports performance. According to him, sportsmen who compete at international level are extroverted and emotionally stable. They tend to be dominant, toughminded, self-assured, self-confident with a high capacity to endure the pressures of competitive sport. They are temperamentally robust. However, Davies concluded that extraverts are likely to be at a disadvantage in sports like rifle shooting and archery in which the emphasis is on accuracy.

In recent studies by Grossworth-Maticek et al (1990) and William and Wideyer (1991) the importance of attitudes in determining success in soccer and boxing and group cohesion and team performance in golf respectively have been conclusively established. Martin and Gill (1991) from their study established that sport confidence and self-efficacy were predictive of sport performance.

Aggression and Sports Performance

The social learning theorists provided a conceptual framework explaining the relationship between performance and aggression. If an aggressive performance is successful, then the performer is likely to be more aggressive in similar situation. The initial aggressive behaviour may have been taught directly or learned through modelling. Seeing other players use aggressive, behaviour or aggressive tactics being taught by coaches which increase the probability of success, can influence an athlete to think that aggressive acts are appropriate in competitive sports situations.

The frustration-aggression hypothesis explains how performance can influence aggression. In sports situation when the team or individual is unable to attain its goal, frustration leads to aggression.

Sports psychologists have investigated along these two lines and have empirically tested it. The investigations conducted by Johnson, Hutton and Johnson (1954), Ogilvie and Tutko (1965), Kane (1966) and Singer (1969) suggest that the trait of aggressiveness is more prevalent in successful athletes than in less successful athletes.

Studies by Volkaner (1971), Mc Carthy and Kelly (1978) support such view. Researchers have attempted to find out the exact mechanism through which aggression enhances performance.

Steiner (1972) was of the opinion that the performance outcome of an individual or a team in a competitive situation depends not only on their own performance but also on the performance of their opponents. Aggression could have positive influence on the performance of an individual or a team if the aggressive behaviour harms the opposition either physically or psychologically thereby weakening the resources of the opponent.

Analysing the aggression performance relationship Faulkner (1974) supports the notion that violation strengthens existing bonds and establish new ones among players as they deal with their adversaries. Moreover, Faulkner suggests that aggressive behaviour can improve performance of a group by weakening the opposite unity bonds or collective strength.

The aggression performance relationship have also been studied at the team level. Andrews (1974) found a significant positive relationship ($r = .64$) between the number of penalties the team accumulated and the order of finish in the National Hockey teams. Similar findings are reported by Cullen and Cullen (1975). Albracht (1979) showed that winning handball teams committed more fouls than losing teams.

Kules (1982) studied the correlation between basic aggression and success in full contact Karate. His results showed that there is a multiple correlation of .75 of isolated factor of basic aggression and success in Karate. The determination coefficient of .56 confirmed the hypothesis that there is significant effect of basic aggression on the success in Karate.

Mc-Ggwan and Miller (1989) reported that more successful Karate athletes scored higher on anger than their less successful colleagues. Daniels and Thornton (1990) found a negative relationship between assaulting hostility and length of training in Karate. Garland and Berry (1990) found that personality traits like aggressiveness alongwith extraversion are predictive of performance in collegiate footballers.

However, Widmeyer and Birch (1979) did not support the linear relationship between aggression and performance in sports. From their study, they discovered a curvilinear relationship between individual aggression and success in sports. Similar findings

have been reported by Wankel (1973), Le Febyre and Passer (1974), Widemeyer and Birch (1975), Birch (1980), Sachs (1978), Underwood and Whitewood (1980) and Birch (1980).

However, Sachs (1978), Widmeyer and Birch (1979), and Underwood and Whitewood (1980) found no difference in aggressive behaviour between the winning and losing teams.

Silva (1984) suggested two reasons for the apparently inconsistent findings regarding aggressive performance relationship and assertive behaviour. Researchers have failed to differentiate between assertive and aggressive behaviour. Secondly, the lack of precise conceptualizing of performance has resulted in the interchangeable use of the terms success, performance and performance outcome.

Anxiety (Arousal) and Sports Performance

The relationship of anxiety and arousal with athletic performance has been studied from either the trait angle or the state angle. The third and most important aspect of studying such relationship is an interactionist approach. In the interactionist model, the athlete perceives personally threatening situations (competitive sports situation, task complexity, crowd behaviour etc.). His A-Trait interacts with these situations to produce A-State reactions and subsequently affects his athletic performance (his overt behaviour).

Sports psychologists generally postulate that athletes having moderate anxiety or arousal perform better than high anxiety athletes. Studies by Gazner (1968), Vaught and Newman (1966), Martins and Landers (1970), Thirer and O'Donkneil (1980), Morgan et al (1988), Hanin (1980) and Cratty and Hanin (1980) support this hypothesis. However, studies by Martens (1969), Martens and Landers (1969), Bush (1970), Adam and Weiriang (1983) and Adam and Weriaingen (1988) found no such positive relationship.

As it is evident from the above review, inconsistent results concerning arousal and performance relationship does not provide a useful guide to sports psychologists. To overcome this inconsistency, the Inverted-U hypothesis was propounded. This hypothesis predicts that performance effectiveness will increase as arousal increases up to some optimal point, where upon further increases in arousal will produce a decrement in performance.

Fenze and Epstein (1967) and Fenz and Zones (1972), Fenz and Zones (1974), and Fenz (1975) have conducted a series of field studies that support the inverted-U hypotheses. They measure the arousal level of sport parachutists by skin conductance, heart rate and respiration rate several times from when they first arrived at the airport until they were about to jump out of the plane. All jumpers showed increased arousal at the time to jump drew closer. However, the novice jumpers tended to show increasing levels of arousal right up until the actual jump, whereas experienced jumpers began to reduce their arousal to a near moderate level prior to the jump. More importantly better jumpers in the novice and experienced groups displayed this pre-jump reduction of arousal to mere moderate levels as compared to poorer performers. These findings support the idea that moderate levels of arousal are more beneficial to performance than high levels.

Klavora (1978) assessed 924 pre-game state anxiety values from 95 boys throughout a Canadian interscholastic High School basketball season. Differences in playing ability were controlled by asking coaches (Post game) to evaluate each player's game performance in terms of the boy's customary ability. The distribution of anxiety means across performance levels supported the inverted U-Curve hypothesis, clearly showing that best performances were associated with moderate pre-game A-State and poorest performances were marked by either the low or very high A-State means. Further, support for inverted U-hypotheses regarding relationship of anxiety and performance has been reported in studies by Griffiths et al (1978, 1979 and 1981).

Gauld et al (1987) empirically tested the Inverted U-Hypothesis with respect to competitive trait anxiety and shooting performance on 39 police officers of Police Training Institute, University of Illinois. It was found that cognitive state anxiety would be more related to performance than would somatic state anxiety and performance were predicted to support the inverted U-Hypothesis.

Martin and Gill (1991) while studying the relationship among competitive orientation, sports confidence, self-efficacy, anxiety and performance, reported that state sport confidence, anxiety and self-efficacy were predictive of sports behaviour.

Follow-up Studies Regarding Personality Changes

Short Term Follow up Studies

Sports psychologists have conducted empirical studies to find out the kind of changes that take place in personality due to persistent participation in competitive sports and physical activities. While studying the effects of a combative sport upon personality dynamics, Johnson and Hutton (1955) came out with significant changes in the behaviour of sportsmen which they attributed to their involvement in a particular type of physical activity. Decrease in anxiety due to sports participation and physical fitness programmes have been reported by Pope Joy (1967), Tattersfield (1975), Odgen (1977), Pollack et al (1978), Seeman (1978), Dickerson (1978), Dienstbier et al (1981), Sacks and Sacks (1981), Dienstbier et al (1987), Khan (1988), Cratty et al (1989) and Tucker (1990). Changes on the extraversion scale has been reported by Ikegami (1970), Yanada and Hiratta (1970), Tattersfield (1975) and Khan (1988). Increase in selfconfidence has been supported by Pollack et al (1978), Seeman (1978), Dickerson (1978), Mansean (1979), Stair (1983), Marsh et al (1986) and Spear (1988).

However, Corder (1966) investigated the effect of an intensive twenty-day physical education programme on intellectual, physical and social development of mentally retarded children between 12 and 16 years of age. The criterion measures were the WISC full scale-mean-scores for intellectual performance, the AAHPER youth fitness test for the physical performance and the Cowell's personal distance scale for social behaviour. The results showed gains on the intellectual, physical and social performance, especially between the training and control groups.

Dowd and Innes (1981) found significant differences on the 16-PF between squash and volleyball players and between high and average level competitors. They note "the present analysis showed differences at high levels of participation which suggest that those who by special enthusiasm, drive and ability have graduated to position of success may be identifiable as having a common constellation of personality characteristics".

Folkins and Sine (1981), however, concluded from their studies that there were no global changes in personality test scores after a fifteen week aerobic training programme.

Mugno and Feltz (1985) tested the social learning theory of aggression in young male football players. They found that many illegal aggressive acts were observed in college and professional footballers and there was relationship between these observations and their subsequent use in players' game.

Marsh et al (1986) followed up participants in intensive physical exercise. The participants who were in the age group of 16 to 31 years were assessed on self-description questionnaire in the beginning and the end of the programme. Results revealed that the subject's self concept was enhanced after undergoing the sport training programme.

Cramer et al (1990) conducted a study to find out the relationship between moderate exercise training and personality traits in women. The patterns of change over time between groups was not significantly different for any of the personality traits as measured by the Cattell's 16 PF. Training is insufficient intervention to produce personality changes in sedentary middle-aged obese women.

Longitudinal Studies

The importance of longitudinal studies has been emphasized by psychologists like Cattell (1960), Takala (1964), Faulkner (1967). Silva (1984) and Cratty (1989) also emphasise the use of longitudinal studies to assess both team and individual fluctuations as influenced by situational variables, personal mood states and psychological interventions.

Werner and Gotheil (1966) investigated the effect of athletic participation over four years on cadets, but found no evidence to indicate that athletic involvement affected the 16 PF structure of these young men. Rushall (1968) likewise could find no consistent personality change among sportsmen particular in track and field, football and swimming over a period of three years.

Kane (1968) followed up 75 physical education students for three years. His conclusions were that no demonstrable change took place in the group as a whole indicating that no general personality change takes place due to long-term involvement in physical activities.

One pioneering study has been performed by Lukehart (1969) who tested a group of 12 and 13 years old boys prior to their decision to become members of an organized sport team. It will be noted that those boys who selected to join the team (American football) were significantly more extroverted than those who selected not to participate (non-athletes). Also, he re-tested both groups following the first year of competition and found these differences to have remained unchanged. It did not differ on neuroticism at either point. It would be predicted from the outset of their careers and athletic competition would not be expected to modify this trait.

In another pioneering study, Tattersfield (1975) followed up 106 boys who were members of 23 swimming clubs for a period of five years. The objective of the study was to find out the effect of frequent and regular exposure to a highly competitive environment on the personality development of boys. It was Tattersfield who provided a reasonable explanation for the insignificant personality changes in Kane's longitudinal study. He pointed out that there are many influences in a competitive environment which changes more than those are more likely to show at a younger age, i.e., during the formative years of childhood and adolescence. Hence, Tattersfield selected subjects in the age group of 12 to 14 years. His findings were quite revolutionary in the sense that the total personality profile did change during the experimental period. The most prominent changes were in the directions of increased extraversion, decreased anxiety and a lower level of independence. Buccola and Stone (1975) reported similar kind of findings as Tattersfield.

In a 12 month follow up and pre-post analysis by Doyné et al (1987) indicated development of feelings of accomplishment and enhanced self-efficacy in subjects. Edgar (1988) investigated the relationship between sport-practice in a longitudinal study with a group of sportspersons playing different games over a period of 27 months. The personality variables as measured by Thill's sport personality questionnaire showed significant change with respect to emotional control and energetic control.

Mayer et al (1988) conducted an eighteen month prospective study of personality traits as measured by Cattell's children's Personality Questionnaire and 16 PF Questionnaire. They found that the primary personality trait scores for both adults and children had relatively low stability over the 18 months interval.

Nelson et al (1991) in a recent study examined the longitudinal change in throwing performance. They concluded that while hereditary factors may be operating to increase the differences in throwing performance across the three years span, girls do not throw as far as boys because the developmental level of their movement pattern shows little change.

Conclusion

This chapter reviewed research studies regarding the personality profiles of outstanding sportspersons. The relationship between different psychological characteristics like aggression, anxiety (arousal) and sports performance was also reviewed. At the end, both short term follow-up studies and longitudinal studies regarding personality changes in sports environment were reviewed.

Design and Procedure

Sample

The present longitudinal study was conducted with a sample of 360 male and female students of Shivalik Public School, Mohali and Government Senior Secondary School for Girls, Nehru Garden, Jalandhar. The sample of Shivalik Public School, Mohali consisted of 256 students, out of which 134 students were sports persons and 122 students were non-sportspersons. A total number of 104 students were taken from the Government Senior Secondary School for Girls, Nehru Garden, Jalandhar out of which 52 girl students were sportspersons and the remaining 52 girl students were non-sportspersons. The data collection duration was every 6 months starting from September, 1990. The last phase of data collection ended in April, 1992. Due to mobility of parents and students, 12 subjects dropped out. Hence the final sample consisted of 348 subjects. The number of male sportspersons was 103 drawn from Athletics (17.48%), Badminton (10.68%), Basketball (12.62%), Football (13.60%), Hockey (19.42%), Martial Art (11.64%), and Volleyball (14.56%). Similarly the female sportspersons (76) were drawn from Athletics (15.79%), Badminton (1.32%), Basketball (7.89%), Gymnastics and Kho Kho (15.79%), Hockey (26.32%), Martial Art (19.73%) and Volleyball (13.16%). The combined sample of male and female sportspersons included athletics (16.76%), Badminton (6.70%), Basketball (10.61%), Football (7.82%), Gymnastics (6.70%), Hockey (22.35%), Martial Art (15.08%), and Volleyball (13.98%) respectively. The non-sports persons of 169 included 60 males and 109 females, whereas the entire sample of subjects (348) included 163 males and 185 females.

The distribution of sportspersons with respect of their age is given in Table 3.1. On the basis of age, the players were divided into four categories i.e. 10 + years, 11 + years, 12 + years and 13 + years.

TABLE 3.1
Distribution of Sports Persons on the Basis
of their Age - Group

| Game | Male | | | | | Female | | | | |
|--------------------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|
| | 10 + | 11 + | 12 + | 13 + | Total | 10 + | 11 + | 12 + | 13 + | Total |
| Athletics | 2 | 6 | 6 | 4 | 18 | 2 | 3 | 4 | 3 | 12 |
| Badminton | 2 | 1 | 5 | 3 | 11 | — | — | — | 1 | 1 |
| Basketball | 2 | 2 | 4 | 5 | 13 | — | 2 | 1 | 3 | 6 |
| Football | 3 | 2 | 5 | 4 | 14 | — | — | — | — | — |
| Gymnastics | — | — | — | — | — | 2 | 3 | 4 | 3 | 12 |
| Hockey | 7 | 4 | 4 | 5 | 20 | 3 | 3 | 8 | 6 | 20 |
| M. Art | 3 | 2 | 4 | 3 | 12 | 2 | 3 | 4 | 6 | 15 |
| Volley ball | 2 | 3 | 4 | 6 | 15 | 1 | 1 | 3 | 5 | 10 |
| Total | 21 | 20 | 32 | 30 | 103 | 10 | 15 | 24 | 27 | 76 |
| Persons sports | | | | | | | | | | |
| Percentage- | 20.39 | 19.42 | 31.07 | 29.12 | 100 | 13.6 | 19.74 | 31.58 | 35.52 | 100 |
| All | 18 | 19 | 14 | 9 | 60 | 28 | 38 | 29 | 14 | 109 |
| Non-sports persons | | | | | | | | | | |
| Percentage | 30 | 31.67 | 23.33 | 15 | 100 | 25.69 | 34.86 | 26.61 | 12.84 | 100 |
| All subject | 39 | 39 | 46 | 39 | 163 | 38 | 53 | 53 | 41 | 185 |
| Percentage | 23.93 | 23.93 | 28.21 | 23.93 | 100 | 20.54 | 28.65 | 28.65 | 22.16 | 100 |

From Table 3.1 it is evident that the subjects both from the sports person and nonsports person groups are more or less evenly distributed among the four age groups. The percentage of subjects belonging to these four age groups varies between 20.54 to 28.65. However, in case of the non-sportspersons, the percentages of males and females belonging to the 13 + age group are 15 and 12.84 respectively. On the other hand, the percentage of male sports persons in the age group of 12 + is 19.42 whereas it is 13.16 in case of female sportspersons in the age group of 11 +.

Children's Personality Questionnaire (CPQ)

The children's personality questionnaire (CPQ) as developed by Porter and Cattell (1968) was used in the present study. It is a reliable, valid and convenient personality measure for children and adolescents. The test was designed keeping in view the following

aims of sound and strategic personality measurement: (a) to cover all the measures, dimensions of factors analytically demonstrable in any attempt to describe individual differences comprehensively, (b) to apply the questionnaire conveniently either as an individual test, in the clinic, or as a group test, in the classroom, and (c) to deal with psychologically meaningful and predictively important tests having demonstrable functional unity which are central to psychologically personality theory.

The CPQ is primarily intended for an age group of eight to thirteen years. However, as it overlaps with the high school personality questionnaire by a year, one year relaxation may be permissible at the upper age level.

The CPQ consists of two forms, form A and form B. Form A is made up of part A1 and A2, each consisting of 70 items, 5 per factor. Similarly form B consists of part B1 and part B2. Each item (except factor B) has a forced choice, yes or no answer.

The test's items are designed in such a manner so as to minimize the effects of distortion brought on either by deliberate faking or by subconscious motivational forces. This has been achieved by way of contribution of items which are natural with regard to social desirability and which have a low level of face validity.

The test is administered without a time limit. However, it might be better to divide the testing time into two parts for a given form. A single session generally takes 50 minutes.

Porter and Cattell (1968) reported that CPQ has three measures of reliability: (a) short-term test-retest reliability which may be termed as dependability, (b) homogeneity (internal consistency) and (c) equivalence (intra - form correlations). The dependability coefficients vary from .42 to .84, the homogeneity scores from .072 to .68 and the equivalence score from .32 to .61. The direct concept of validity of this test varies from .33 to .95 and the indirect validity coefficient from .66 to .95.

California Child Q-Set Test

The Q-sort method has been widely used for observer's evaluation. Block (1978) developed the California Q-sort deck which was originally developed to provide a standard language for comprehensive personality evaluations by professionally trained observers. The deck was subsequently published for more general

distribution. An adaptation of this deck for use at younger ages was the California child Q-set also developed by Block and Block (1980).

The CCQ was constructed to describe children's personalities. It consists of hundred statements to be sorted into a 9 point forced distribution. The statements sorted with regard to their reliance for the individual, i.e. their importance in specifying the unique and essential characteristics of the individual. Thus, the Q-sort method describes the most important characteristics of the individual and is not a normative procedure in which the individual is compared with others.

There is no specific time period for completing the CCQ. Most people complete the Q-sort in 35 to 60 minutes. An advantage of the Q-sort method is that the use of 9 categories, which force the sorter to place items at each position on the scale. Because of this 9 - point forced distribution, it helps the sorter to avoid the operation of a halo effect and to overcome the common reluctance to use extreme categories on a rating scale. The equal distribution of items among categories maximizes discrimination of the behaviours of different children or between one child's behaviours at different times. The availability of a uniform set of Q-sort items facilitates communication from different observers. Another application involves the use of this technique in individual assessment. In this connection, Block (1978) provides example of three defining Q-sorts representing a consensus evaluation of an optionally normal individual and two psychiatric syndromes, against which a given individual's Q-sort can be compared. Similar defining Q-sort may be developed for any desired category of persons (Anastasi, 1988). The California Q-Set (C.Q-Set) (Block, 1978) is the instrument used by individuals to characterize their own personality. The C.Q-Set provides comprehensive coverage of the personality domain, which makes it applicable to a limitless number of personality characteristics and behaviour. The C.Q.-Set consists of 100 descriptive personality statement, which are sorted by the respondent into nine categories ranging from least to most characteristics.

Under the interactional paradigm, the task of sports personality researchers is to construct meaningful sports situations from the environment that interest them and then get athletes to respond to these situations with a variety of personality indicants. Under this

strategy, individual athletes can use whichever response modes seem most representative to capture their unique individuality. Inherent in such athletes-on-sport context data are the important individual differences so central to the comprehension of personality. In order to have a suitable test which will capture how the characteristics or persons and situations interact to determine behaviour, Craig A. Fisher (1984) suggested modification of the California Q-Set as developed by Block (1978).

In order to incorporate the context or situational specificity in the C.Q.Set Test, the hundred items under this test were modified by the present author to describe sports specific situations. The sport persons were asked to sort the modified personality descriptions according to how well each statement is characteristic and salient of the self in the particular sports environment of interest. To the degree that the athlete can capture the essence of the sport demands in his/her mind while self-sorting, the data represent person situation interaction.

Block (1978) and Block and Block (1980) have provided thorough discussion of the use of Q-Sort data. However, in most of the empirical studies using the Q-sort technique descriptive analysis of individual sort has been carried out. The limitation in this kind of descriptive analysis is that it does not provide any scope for objective comparison of one group of individuals with another at a particular point of time. Hence, there is a need to develop a methodology for subjecting the Q-Sort data to numerical/statistical analysis. The present author has attempted to provide one such technique.

Using the Q - Sort, the sports persons select a specified number of item in each of the nine categories which range from Category 9, that is, extremely characteristic or salient to category 1, that is, extremely uncharacteristic or negatively salient. The nine category cards included in the CPQ deck are labelled as follows :-

Category 9 : Extremely characteristic or salient.

Category 8 : Quite characteristic or salient.

Category 7 : Fairly characteristic or salient.

Category 6 : Somewhat characteristic or salient.

Category 5 : Relatively central or unimportant.

Category 4 : Somewhat uncharacteristic or negatively salient.

Category 3 : Fairly uncharacteristic or negatively salient.

Category 2 : Quite uncharacteristic or negatively salient.

Category 1 : Extremely uncharacteristic or negatively silent.
The nine categories represent a scale as follows :

| Cat. 4 | Cat. 5 | Cat. 6 | Cat. 7 | Cat. 8 | Cat. 9 |
|-----------|-----------|-----------|-----------|-----------|-----------|
| - 1 | 0 | + 1 | + 2 | + 3 | + 4 |

- 4 score represents extremely negative. This implies that any item in this category is extremely uncharacteristic of the person. - 3 score implies the item under this category is quite uncharacteristic of the person but not as extremely uncharacteristic as items under Category - 4 score. + 3 score implies the item under this category is quite characteristic of the person. Similarly, other points on this scale can be described accordingly.

When the CQ test is administered, each of the sports persons categorise each of the 100 items into one of the nine categories. Each categorise can be given marks like - 4, - 3, - 2, - 1, 0, + 1, + 2, +3, and + 4 etc. Hence, each item will get a score from each student.

The difficulty in the above method is that each of the hundred items will have an individual score. This will lead to repetitive analysis of 100 items. In order to reduce repetition in statistical analysis, items may be grouped together according to their closeness to each other, each being a part of the spectrum of a factor. It may be mentioned here that the original CCQ items are more or less-characteristics taken from the 14 factors described by Porter and Cattell (1968) and 16 factors by Cattell. According to the sorting by the present author the 100 items can be clubbed into the following factor groupings :-

| S.No. | Name of factor | S.No. of items |
|-------|----------------|---|
| 1. | Factor A | 2, 3, 4, 6, 8, 9, 14, 42, 64, 73, 75, 76, 79, 86, 92, 94, |
| 2. | Factor B | 68 |
| 3. | Factor C | 10, 31, 38, 53, 54, 63, 80, 91 |
| 4. | Factor D | 21, 34, 56, 58, 82 |
| 5. | Factor E | 17, 21, 27, 29, 31, 32, 44, 47, 53, 62, 63, 69, 83, 85, 90, 93, 100 |
| 6. | Factor F | 1, 7, 28, 36, 51, 52, 84 |
| 7. | Factor G | 13, 15, 17, 20, 30, 41, 53, 74, 76 |

(Contd.)

| | |
|----------------|--|
| 8. Factor H | 35, 40, 98 |
| 9. Factor I | 25, 48, 55, 57, 70, 71, 77, 87, 88, 97. |
| 10. Factor J | 5, 17, 18, 20, 42, 87, 92, 99 |
| 11. Factor N | 16, 19, 20, 22, 37, 61, 81, 89, 96 |
| 12. Factor O | 11, 12, 23, 24, 33, 49, 59, 60, 72, 77, 78 |
| 13. Factor Q 3 | 65, 91, 95 |
| 14. Factor Q 4 | 12, 39, 43, 45, 46, 50, 60, 64 |

It may be seen from the above sorting that some of the items are placed in more than one category.

The above manner in which the characteristics are clubbed together into constellations is supported by Block and Block (1980). According to them, "although one item is placed high in the descriptions of both Child A and Child B, the constellations of items distinguished the children. Child A is described as an anxious, immature child who expresses difficulty in coping with adversities by crying and sulking. Child B, however, is depicted as child whose intolerance of frustration results in aggressive attacks on other people. The constellations of items make the descriptions relatively comprehensive, dynamic, and individualized". Once the above type of constellations of sports specific characteristic is accepted, it is easy to subject the Q-set data to statistical and numerical analysis.

To sum up, the C.Q. set consists of 100 descriptive personality statement, which are sorted by the respondent into nine categories ranging from least to most characteristics. In order to incorporate the context or situational specificity in the CQ - Set test, that hundred items under this test were modified by the present author to describe sports specific situations. The 100 items are sorted into 14 categories keeping in view their affinity to the psychological attributes under the 14 factors of CPQ. Items were given numerical scores by each sorter thereby facilitating statistical and numerical analysis. The modified CQ-set test in the sports context is given in Appendix I.

Sports Performance Scale

The Sports Performance Scale (SPS) was developed by the present author to have an effective comparison of levels of performance of different sports persons. The scale was designed to know the achievements of sports persons from their participation and place-

ments in competitive events. Score points were ranging from 0 to 10 based on the participation achievements of sports persons in school events to world championship of appropriate age group. Thus, an individual performance score can be compared with any other individual. This scale is not designed to know the performance of an individual in a particular discipline with respect to the skill and ability to win matches but to compare a large number of sports persons across several disciplines with respect to a broad-banding of performance through participation and placement in competitive events. The scale was designed to categorize a particular person as a low, medium or high performer within his own age group and when compared with different sports persons of his/her age groups belonging to several disciplines. It further helps to know the changes in the level of performance of a particular individual or a group of individual over a period of time.

The performance scale was designed taking into consideration the participation and position achieved at different levels of competition. Table 3.2 gives the range of marks to competitors for different levels of competition and achievement.

TABLE 3.2
Assignment of Marks for Competitors at Different Levels

| S.No. | Type of competition | Marks for obtaining position (1st, 2nd, 3rd) | Marks for parti- cipation |
|-------|---|--|------------------------------------|
| 1. | Olympic Games, Commonwealth Games, Asian Games, World Tournaments/ Championship in respective Games | 10 | 9 |
| 2. | Asian Federation Cup Tournament, International Tournaments other than those mentioned against Sr. No. 1. All India Combined Universities team which participated in the Senior National; National Championship/Inter-State Championships organized by the recognised National Federations. International meets/Championship for Juniors, National games organised by I.O.A., All India Combined Universities team participating in World Universities Championship, National Championship for Women and National School Games | 8 | 7 |

(Contd.)

TABLE 3.2 (Contd.)

| S.No. | Type of competition | Marks for obtaining position (1st, 2nd, 3rd) | Marks for parti- cipation |
|-------|---|--|------------------------------------|
| 3. | All India Inter-Varsity Tournaments, Inter-District, State Championships organised by the recognised State Sports Associations, State Games organised by State Olympic Association. State Championship for Women organised by State Sports Department and State School Games. | 6 | 5 |
| 4. | District Level Competitions organised by District Sports associations. Inter-College University tournaments. | 4 | 3 |
| 5. | Inter Schools District Tournaments | 2 | 1 |
| 6. | School Champions | 0.5 | 0 |

The detailed inventory provided to the coaches and the sports persons to elicit information regarding their participation and achievement of position in the above kind of competition is placed at Appendix-II.

Validity of Performance Scale

The sports performance scale was developed on the basis of classification of levels of competition according to the guidelines provided by the Directorate of Sports and Youth Affairs, Government of Punjab for awarding gradation certificates to the sports persons. Moreover, the questionnaire as placed in Appendix II is answered by the sports persons themselves and further is authenticated by their coaches and principal of the school with regard to their achievement at different levels of competition. Hence, the validity of the sport performance scale is adequately taken care of.

Design

The present study was designed to find out the personality and behavioural changes over a period of time when sports persons were subject to sports environment, to find out the person-situation interaction at a point of time with respect to sports persons and to find out the changes in the level of performance of sports

persons over a period of time. The details of the design and the statistical procedures used are given below :

1. Students *t*-ratio were computed to study the relationship of standard scores pertaining to various psychological factors (as per CPQ) for (a) male and female sports persons and non-sports persons, (b) sports persons playing group and individual games and (c) sports persons belonging to different age groups.
2. The comparison of the standard scores of various psychological factors for the four phases were made by using the means of different phases and drawing histogramms.
3. The changes in the stenscores over time were analyzed by using the *t*-test between the mean scores of the first and second phases, first and third phases, and between the means of the first and fourth phases. This comparison was made with respect of male and female sports persons, male and female non-sports persons and sports persons belonging to different games.
4. The changes in the level of performance of sports persons as a whole and belonging to different games sexewise were found out by getting the mean performance scores over a period of time. Further, the comparison of mean scores concerning performance was carried out by finding the *t*-ratio of the mean scores of different phases.
5. To find out the relative contribution of variance from situations, two-way interactions between persons and situations and residual, the variance components approach as developed by Gleser, Crombach, and Rajaratnam (1965), and by Endler and Hunt (1966) was adopted.

The design of the modified CQ - set test allowed for identification of persons and situations as sources of behavioural variance in sports specific situations. Though it may be known by simple two-way analysis of variance that persons and situations accounted for a statistical significant portion of the variance, the variance components had to be partitioned in order to assess the relative contribution of the various sources. Before carrying out the partitioning of the variance, the two - way analysis of variance was carried out assuming a mixed effects model. The mixed model may

be more appropriate for use in these data since the sports specific situations were not random samples of all possible situations. However, with the mixed effects model, the mean squares have the following expectations in terms of the various component sources of variance.

$$E(MSp) = Z_2 + mX_2 + I_2$$

$$E(MSt) = Z_2 + nY_2 + I_2$$

$$E(MSp_t) = Z_2 + I_2$$

$$E(MSr) = Z_2$$

Note : 'p' stands for persons, 't' for situations, 'pt' for person \times situation interaction, 'r' for residual, 'X₂' for variance due to persons, 'Y₂' for variance due to situations, 'Z₂' for variance due to residual and 'I₂' for variance due to person \times situation interaction.

These are four independent equations with only four variables, X, Y, Z and I - the four variance components pertaining to persons, situations, residual and the two-way interaction between persons and situations. When the observed mean squares were substituted for their expectancies, the above four equations were solved for each of the component sources of variance.

The variance components approach was carried out with respect to psychological variables associated with Factors A, C, D, E, F, G, H, J, N, Q₃ and Q₄ separately.

Procedure

Procedure for CPQ Test

The CPQ data were collected from 348 subjects out of which 179 were sports persons and the remaining 169 were non-sports persons. Both the sports persons and non-sports persons belonged to two schools namely, the Shivalik Public School, Mohali and the Senior Secondary School for Girls, Nehru Garden, Jalandhar City. These schools were specially chosen by Sports Authority of India (SAI) and the Sports Department of Government of Punjab for admitting selected young sports persons for imparting special coaching and training. The sports persons usually stay in the sports hostels of their respective schools.

The CPQ test was administered to the subjects for four times, at an interval of six months each. The first phase, of data collection

was carried out in October, 1990 and the last in April, 1992. CPQ test consists of two forms, each containing two parts (A_1 , A_2 , B_1 and B_2). All these forms were used and interpretation was made on the composite scores of each factor. The test was administered without a time limit, but each form was used in a single session.

At the beginning of administering the test in each phase the subjects were told to write A_1 , A_2 , B_1 or B_2 as the case may be on the top of the test to indicate the part of the test they are taking. They were told to write at the top of the answer sheet their name, age, grade, sex, and the type of game played by them. The non-sports persons were told not to write anything for the types of games played by them. As soon as all subjects were ready to listen, the instructions were read out loudly while the subjects were asked to read silently.

The subjects were told to answer each and every question in the test. This was repeated once again at the end of the test.

Procedure for Performance Scales

The performance scale as devised by the present author was administered three times. The first phase of data collection was conducted in October, 1990. The second phase was conducted after one year i.e. in October, 1991. The third and last phase was done in April, 1992. The questionnaires were given to the subjects after giving them a detailed instruction as to how the test be answered. The coaches of the respective games were requested to help the subjects in filling up the test. Each subject was told to write his name, age, sex, grade and the type of game played by him/her at the top of the test. To prevent exaggerations by the subjects regarding the achievement in the respective discipline the coaches and the principal of the school were told to verify and countersign each questionnaire after the subjects had completed the questionnaires.

Procedure for Administering the Modified CQ - Set - Test

The modified CQ - set - test contains 100 sports specific situations in 100 item cards. Using the Q sort method the subjects, 179 sports persons, were to place a specified number of the items in the nine categories which range from "Category 9: extremely characteristic or salient" to "Category 1: extremely uncharacteristic or nega-

tively salient." The subjects were told that while using the extreme categories—9, 8, 2 and 1—they were making very strong statements about their own behaviour in sports situations. After giving detailed instructions how to self sort the 100 items into 9 categories, the subjects were read out loudly the following instructions while they were asked to read the same silently :

You have 100 items. These 100 items describe 100 characteristics of an individual in sports specific situations. Some of these items or characteristics may be present with you. Some others may not be with you or with some other items you may be neutral. That means there are not only the extremes like yes or no, but there is something in between these two. The 9 categories represent a scale starting from - 4, - 3 and ending with + 4. - 4 represents extremely negative. This implies that any item in this category is extremely uncharacteristic of you. + 4 implies the item under this category is extremely characteristic to you. 0 implies any item in this category neutral or unimportant for you -3 implies the item under this category is quite uncharacteristic of you but not an extremely uncharacteristic as items under category - 4. - 2 implies the item under this category is fairly uncharacteristic of you. - 1 implies the item under this category is somewhat uncharacteristic of you. + 1 implies the item under this category is fairly characteristic of you under this category. + 3 implies the item under this category is quite characteristic of you.

Your job is to place the 100 items into 9 categories like - 4, - 3, - 2, - 1, 0, + 1, + 2, + 3, + 4. Use the following steps to sort the hundred items cards into 9 categories: (1) Place the 9 category cards across the table starting from - 4, - 3, - 2, - 1, 0, + 1, + 2, + 3 and + 4. (2) Shuffle the deck of 100 item cards. (3) Read all the cards and divide them into three groups : (i) the first group of statements those for the most part, are descriptive of you—the positive group (ii) the second group of those item cards that, for most part, are not descriptive of you—the negative group, and (iii) a third group of items in between these two groups—neutral group. (Please see that the number of items in these three groups are more or less equal). (4) From the positive group, select 11 cards that are extremely descriptive or characteristic of you so that they can be placed in category + 4. (5) Select 11 cards from the positive group which you think are quite descriptive of you so that they can be placed under category + 3. (6) Select 11 cards from the positive group which are

fairly descriptive of you so that you place them in category + 2. (7) Now work with the cards placed in the negative group. Select 11 cards that are mostly not descriptive of you and place them in category - 4. (8) Select 11 cards from the negative group which are quite not descriptive of you and place them in category - 3. (9) Select 11 cards from the negative group which are fairly not descriptive of you and place them in category - 2. (10) Now you work with the neutral group. Select 12 cards that are neither descriptive nor non-descriptive of you and place them under category 0. (11) Select 11 cards out of the neutral group which are somewhat descriptive of you and place them in category + 1. (12) Select 11 cards out of the neutral group which are somewhat non-descriptive of you and place them in category -1.

Results and Statistical Analysis

The present study is concerned with the changes in the psychological characteristics of sportspersons as well as non-sportspersons over a period of time. This study is also concerned with the changes in the levels of performance of sportspersons over a period of time during which they are subjected to competitive sports environment. Thirdly, this study tries to estimate the contribution of different sources of variance of behaviour to the total variance and to find out whether the person \times situation interaction is an important contribution to behavioural variance or not. The psychological attributes were measured in different phases with the help of the Children Personality Questionnaire (CPQ). The present author developed a sports performance scale to measure the changes in levels of performance of sportspersons. The person-situation interaction was measured with the help of the modified CQ-Set test (Block, 1978). CPQ test was administered to the players four times after a gap of 6 months in order to make a follow up programme. The data obtained by applying these tests and measures were subjected to different statistical analyses. The results of the present study are presented in this chapter.

Stenscores on Different Psychological Attributes of CPQ

The results of Phase I data collection are presented in Table 4.1. Table 4.1 describes the mean standard scores with standard deviations of sportspersons belonging to different disciplines. The

TABLE 4.1
Mean Stenscores and Standard Deviations of Sportpersons and Non-sportpersons

| CODE | MEAN & S.D. | No. of Subjects | Fac. A | Fac. B | Fac. C | Fac. D | Fac. E | Fac. F | Fac. G | Fac. H | Fac. I | Fac. J | Fac. N | Fac. O | Fac. Q ₃ | Fac. Q ₄ |
|------|----------------|--------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|------------------------|------------------------|
| AT | Mean S.D. | 30.00 | 5.37 1.35 | 5.73 2.14 | 6.03 1.32 | 4.28 1.33 | 4.77 1.52 | 5.57 1.44 | 6.93 1.93 | 7.30 1.27 | 6.53 1.68 | 5.00 1.48 | 5.20 1.78 | 4.47 1.03 | 5.30 1.63 | 4.20 1.44 |
| FB | Mean S.D. | 14.00 | 4.87 1.79 | 6.35 1.76 | 5.21 1.56 | 4.12 1.00 | 4.50 1.99 | 4.24 1.58 | 7.50 2.38 | 7.21 1.90 | 6.79 1.10 | 5.50 1.50 | 5.22 1.61 | 5.28 1.10 | 6.18 1.59 | 4.36 1.59 |
| VB | Mean S.D. | 25.00 | 4.84 1.67 | 3.96 2.60 | 5.88 0.91 | 4.16 1.05 | 4.72 1.87 | 5.64 | 6.40 1.81 | 6.24 1.82 | 6.92 1.33 | 5.72 1.25 | 5.76 1.45 | 4.64 1.41 | 6.00 1.81 | 4.60 1.50 |
| BD | Mean S.D. | 12.00 | 5.54 0.80 | 5.83 1.14 | 5.97 1.19 | 4.25 1.64 | 4.00 1.23 | 5.00 1.08 | 6.66 2.60 | 6.84 1.21 | 7.64 1.61 | 6.00 1.64 | 4.92 1.11 | 5.08 1.39 | 6.16 1.34 | 4.59 1.32 |
| MA | Mean S.D. | 27.00 | 4.64 1.28 | 6.41 1.45 | 6.19 1.31 | 4.01 1.01 | 4.96 1.65 | 6.70 1.76 | 7.63 1.42 | 7.78 1.57 | 6.00 1.88 | 5.33 1.65 | 5.00 1.05 | 4.19 1.49 | 6.02 1.51 | 3.59 1.31 |
| BB | Mean S.D. | 19.00 | 5.09 1.50 | 4.89 2.51 | 6.71 1.45 | 3.96 1.38 | 5.00 1.69 | 5.79 1.15 | 6.89 1.52 | 7.16 1.92 | 6.74 1.07 | 5.10 2.17 | 4.69 1.13 | 4.69 0.92 | 6.37 1.98 | 4.10 1.33 |
| HC | Mean S.D. | 43.00 | 4.93 1.69 | 3.56 2.49 | 6.41 1.85 | 4.03 1.48 | 4.95 1.64 | 5.97 1.93 | 5.91 2.05 | 6.14 1.48 | 6.76 1.72 | 4.84 1.60 | 5.40 1.56 | 4.79 1.28 | 5.88 1.62 | 4.49 1.52 |
| GM | Mean S.D. | 12.00 | 2.89 0.70 | 4.67 0.49 | 5.67 0.45 | 4.11 1.05 | 6.45 0.64 | 6.33 1.16 | 6.22 0.90 | 6.44 1.29 | 5.89 1.41 | 4.44 0.76 | 6.23 0.8 | 4.78 | 5.89 | 4.89 |

mean stenscore of males and females belonging to individual disciplines have not been given separately because in certain disciplines the sportspersons belong to only one sex and in other disciplines the number of male or female sportspersons were not large enough for statistical analysis.

Factor A measures syzothymia and cyclothymia. The standard scores called stenscores vary from 1 to 10. In this standard scale, the average is taken from 4.5 to 6.5. Students scoring extremely low can be considered as syzothymic, which means they are reserved, detached, critical and cool. In case, a student scores extremely high, he will be considered as cyclothymic implying that he is outgoing, warmhearted, easy-going and participating. If a student scores in between i.e. his score falls in the average area of the scale (4.5 to 6.5), then he/she will be neither considered as reserved, detached, critical, and cool nor outgoing, warmhearted, easy-going or participating.

Table 4.1 indicates that the standard scores with respect to Factor A varies between 2.89 in case of the gymnastic group to 5.54 in case of the badminton group.

Except in case of the gymnastic group all other groups of sportspersons have scored averagely on Factor-A. From this it is inferred that the gymastic group as a whole are cool, critical, detached, whereas all other groups of sportspersons as a group tend to be moderately outgoing, warm hearted, easy-going or participating.

Factor B measures intelligence scores of the subjects. Except hockey players, all other groups of sportspersons has scored moderately on this factor implying they are averagely intelligent. The hockey players tend to be less than averagely intelligent.

Factor C measures emotional stability of subjects. From Table 4.1, it is evident that all the groups of sportspersons have scored more than average on this scale. It is inferred from this that all the groups of sportspersons, irrespective of the games they play, are emotionally stable.

Factor D measures phlegmatic—excitability dimensions of personality. From Table 4.1, it can be inferred that all the groups of sportspersons have scored less than average on this scale. They tend to be on the phlegmatic side of the scale implying sportspersons, irrespective of the games they play are not high on the excitability score.

Factor E provides scores on the submissiveness-dominance scale. This is one of the important personality dimensions of sportspersons. From a perusal of Table 4.1, it is evident that except the badminton players all other sportspersons have scored slightly more than the average on this scale. From this it is inferred that except the badminton players, who tend to be slightly submissive, sportspersons tend to be mildly on the dominance scale.

Scores in Factor F measures desurgency-surgency dimensions of personality. From Table 4.1, one can say that football players are moderate on the desurgency scale whereas all other groups of sportspersons are moderate on surgency dimension of desurgency-surgency scale.

Factor G provides insight into the super-ego strength of individual or groups. The sportspersons playing different games have scored more than the average on this scale. Particularly football, martial arts and basket ball athletes have high super-ego strength while other groups of athletes have moderately high super-ego strength.

Factor H provides insight into the therctia - parmia dimensions of personality. From Table 4.1, it is clear that sportspersons, irrespective of the game they play, have scored highly on the therctia-parmia scale. The scores of sportspersons vary from 6.14 in case of hockey players to 7.78 in case of martial arts athletes. Hence, it can be inferred that the sportspersons irrespective of the games they play are moderately to highly parmic.

Factor I provides insight into the harria-premsia dimension of personality. From Table 4.1, it is evident that sportspersons have scored averagely high on this scale. The stenscores vary from 5.89 in case of gymnastic athletes to 6.76 in case of hockey players. From this one can infer that sportspersons playing different games are mild on the *premsia side* of this personality dimensions.

Factor J refers to the Zeppia-Coasthenia dimension of personality. Stenscores of sportspersons vary from 4.44 in case of gymnastic athletes to 6.00 in case of badminton players. As most scores hovers around the middle of the scale, it can be safely inferred that sportspersons playing different games are neither zappic nor coasthenic.

Factor N provides insight into the naivete-shrewdness dimension of personality. From Table 4.1, it is clear that all the sportspersons, irrespective of the games they play, have scored

moderately on this scale. Only the gymnastic athletes are moderately shrewd whereas all others can be termed as neither shrewd nor naive.

Factor O provides us insight into the untroubled adequacy-guilt-proneness dimension of personality. A perusal of Table 4.1 provides the information that all the groups of sportspersons have scored averagely on this scale. The stenscores vary from 4.19 in case of martial art athletes to 5.28 in case of football players. Hence, one can infer that these sportspersons do not have much guilt proneness as characteristic of their personalities.

Factor Q₃ refers to selfsentiment dimension of personality. From Table 4.1 it is evident that all the sportspersons, irrespective of the games they play, have scored averagely on this scale. Hence, it is inferred that these sportspersons playing different games do not have positive or negative extreme scores on this scale.

Factor Q₄ provides insight into the ergic tension aspect of personality. Table 4.1 shows that sportspersons irrespective of the game they play have scored less than 5 on this scale. The scores vary between 3.59 in case of martial art athletes to 4.89 in case of gymnasts. Hence These sportspersons are low on the ergic tension scale.

Personality Profiles of Sportspersons as a Whole

In the previous section, we have discussed the personality profiles of individual groups of sportspersons belonging to disciplines like athletics (AT), football (FB), volley ball (VB), badminton (BD), martial arts (MA), base ball (BB), hockey (HC) and gymnastics (GM). Table 4.2 provides the stenscores of sports persons and non-sportspersons belonging to the two sexes.

The entire group of male sportspersons have scored moderately on psychological scales of CPQ except on three scales, namely Factor E, Factor F and Factor Q₄. Male sportspersons can be termed as moderately outgoing, sociable, intelligent, emotionally stable, less excitable and having moderate ego-strength. Furthermore, they are moderately parmic and premsic, they are neither zeppic nor coasthenic. Similarly they are neither shrewd nor naive. They are normal individuals with regard to untroubled adequacy-guilt-proneness and self-sentiment dimensions of personality. However, the male sportspersons are low on submissiveness-dominance, disurgency-surgency and ergic tension scales.

TABLE 4.2
Mean Stenscores and Standard Deviations of Sportspersons and Non-sportspersons

| CODE | Mean & S.D. | No. of subjects | Fac. A | Fac. B | Fac. C | Fac. D | Fac. E | Fac. F | Fac. G | Fac. H | Fac. I | Fac. J | Fac. N | Fac. O | Fac. Q ₃ | Fac. Q ₄ |
|--------------|-------------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------------------|---------------------|
| All Male | Mean | 103.00 | 5.20 | 6.25 | 5.93 | 4.53 | 4.28 | 4.12 | 7.19 | 6.87 | 7.21 | 5.43 | 4.91 | 4.88 | 6.81 | 4.16 |
| S.P. | S.D. | | 1.33 | 1.38 | 1.26 | 1.23 | 0.57 | 1.21 | 1.19 | 1.25 | 1.36 | 1.28 | 1.24 | 1.00 | 1.20 | |
| All Female | Mean | 76.00 | 4.41 | 3.30 | 6.33 | 3.53 | 5.67 | 8.01 | 6.04 | 6.82 | 5.24 | 4.90 | 5.82 | 4.38 | 5.82 | 4.47 |
| S.P. | S.D. | | 0.95 | 1.47 | 1.01 | 0.96 | 0.64 | 1.33 | 1.55 | 1.24 | 1.02 | 1.18 | 1.08 | 1.22 | 1.19 | 1.18 |
| All | Mean | 179.00 | 4.86 | 5.00 | 6.10 | 4.11 | 4.87 | 5.77 | 6.70 | 6.85 | 6.32 | 5.20 | 5.30 | 4.67 | 6.39 | 4.29 |
| S.P. | S.D. | | 1.20 | 1.42 | 1.16 | 1.12 | 1.26 | 1.26 | 1.35 | 1.25 | 1.23 | 1.24 | 1.18 | 1.10 | 1.27 | 1.19 |
| All Male | Mean | 60.00 | 5.30 | 5.85 | 6.00 | 4.15 | 3.77 | 4.45 | 7.05 | 6.13 | 6.98 | 4.90 | 4.13 | 4.77 | 7.05 | 3.68 |
| N.S.P. | S.D. | | 1.46 | 1.86 | 1.66 | 1.69 | 1.68 | 1.44 | 1.56 | 1.38 | 1.36 | 1.80 | 1.45 | 1.36 | 1.38 | 1.59 |
| All Female | Mean | 109.00 | 4.26 | 4.21 | 5.99 | 4.55 | 5.17 | 6.54 | 6.44 | 5.59 | 5.09 | 5.77 | 4.81 | 6.20 | 4.58 | 1.56 |
| S.P. | S.D. | | 1.79 | 2.10 | 1.58 | 1.36 | 1.65 | 1.53 | 1.79 | 1.56 | 1.28 | 1.30 | 1.35 | 1.23 | 1.66 | |
| All | Mean | 169.00 | 4.63 | 4.79 | 5.99 | 4.41 | 4.67 | 5.80 | 6.66 | 6.33 | 6.07 | 5.02 | 5.19 | 4.80 | 6.50 | 4.26 |
| N.S.P. | S.D. | | 1.75 | 2.17 | 1.61 | 1.50 | 1.79 | 1.80 | 1.74 | 1.51 | 1.47 | 1.50 | 1.59 | 1.28 | 1.62 | 1.63 |
| All Male | Mean | 163.00 | 5.24 | 6.10 | 5.96 | 4.39 | 4.09 | 4.24 | 7.14 | 6.60 | 7.13 | 5.23 | 4.62 | 4.84 | 6.90 | 3.98 |
| S.P. | S.D. | | 1.39 | 1.60 | 1.49 | 1.43 | 1.62 | 1.29 | 1.43 | 1.35 | 1.08 | 1.46 | 1.36 | 1.16 | 1.41 | 1.39 |
| All Female | Mean | 185.00 | 4.32 | 3.83 | 6.13 | 4.13 | 5.38 | 7.15 | 6.28 | 6.60 | 5.45 | 5.01 | 5.79 | 4.63 | 6.04 | 4.53 |
| S.P. | S.D. | | 1.50 | 1.87 | 1.37 | 1.21 | 1.33 | 1.45 | 1.69 | 1.44 | 1.18 | 1.25 | 1.25 | 1.23 | 1.48 | 1.42 |
| All Subjects | Mean | 348.00 | 4.75 | 4.90 | 6.05 | 4.25 | 4.77 | 5.79 | 6.68 | 6.60 | 6.23 | 5.12 | 5.24 | 4.73 | 6.44 | 4.28 |
| S.D. | S.D. | | 1.45 | 1.74 | 1.43 | 1.32 | 1.47 | 1.38 | 1.58 | 1.40 | 1.13 | 1.35 | 1.30 | 1.20 | 1.45 | 1.41 |

On the other hand, the female sportspersons have also scored moderately on Factor C, Factor G, Factor I, Factor J, Factor N and Factor Q3. Hence, the female sportspersons have shown extremes on these personality dimensions. However the female sportspersons as a group have scored highly on Factor F, and Factor H implying they are high on surgency and parmic dimensions of personality. Similarly female sportspersons are low on Factor A, Factor B, Factor D, and Factor Q4 implying they are reserved, less intelligent and phlegmatic or less excitable. Moreover they are low on the untroubled adequacy guilt-proneness and self sentiment dimensions of personality.

However, the sportspersons taken as a whole, irrespective of the sex they belong, are found scoring moderately on all factors. Their score varies from 4.11 on Factor D to 6.85 on Factor H. However, they are found to have moderate and normal personality characteristics without having any extremities.

Personality Profile of Non-Sportspersons

Table 4.2 also provides the stenscores on the 14 factors of CPQ of both male and female subjects who are non-athletes. All the male non-athletes have scored averagely on the personality scales except on Factor D, Factor E, Factor F, Factor N and Factor Q4. Similarly, all female non-athletes have scored in the middle range of the personality dimensions except on Factor A and Factor B. Less than average scores of the female athletes imply that they are less out-going and averagely intelligent.

Non-athletes as a group have not scored any extremes on the personality dimensions. They are slightly low on the self-sentiment, sociability, submissiveness-dominance and disurgency - surgency scales.

Difference in Psychological Characteristics of Male and Female Sportspersons as Well as Non-Sport Persons

We have posed sex as a discriminating factor differentiating personality characteristics of sportspersons and non-sportspersons. The *t*-ratio between mean stenscores of male and female sportspersons on all the 14 factors of CPQ are given in Table 4.3. Out of the 14 factors, in case of 11 factors, there are significant difference between the mean stenscores of male and female athletes. However, in case of Factor C,

Factor H and Factor Q₄, there are no significant differences in the mean stenscores of male and female sportspersons.

TABLE 4.3
Sex Differences in Scores on Different Factors

| Factor | Sportspersons | | | Non -sportspersons | | | All | | |
|----------------|----------------|-----------------|----------|--------------------|----------------|----------|----------------|----------------|----------|
| | M | F | t | M | F | t | M | F | t |
| A | 5.20 (1.35) | 4.41 (0.95) | 3.59 ** | 5.30 (1.46) | 4.26 (1.79) | 3.83 ** | 5.24 (1.39) | 4.32 (1.50) | 5.93 ** |
| B | 6.25 (1.38) | 3.30 (7.47) | 13.64 ** | 5.85 (1.86) | 4.21 (2.10) | 5.31 ** | 6.10 (1.60) | 3.83 (1.87) | 12.08 ** |
| C | 5.93 (1.26) | 6.33 (1.01) | 1.46 | 6.00 (1.66) | 5.99 (1.58) | 0.38 | 5.96 (1.49) | 6.13 (1.37) | 1.11 |
| D | 4.53 (1.23) | 3.53 (0.966) | 5.84 ** | 4.15 (1.43) | 4.55 (1.36) | 1.67 | 4.39 (1.43) | 4.13 (1.21) | 1.83 |
| E | 4.28 (1.57) | 5.67 (0.67) | 7.23 ** | 3.77 (1.68) | 5.17 (1.65) | 5.21 ** | 4.09 (1.62) | 5.38 (1.33) | 8.11 ** |
| F | 4.44 (0.30) | 7.49 (1.44) | 14.72 ** | 4.69 (1.38) | 7.33 (1.24) | 12.63 ** | 4.53 (1.34) | 7.40 (1.32) | 20.09 ** |
| G | 7.19 (1.19) | 6.04 (1.55) | 5.59 ** | 7.05 (1.56) | 6.44 (1.79) | 2.20 * | 7.14 (1.43) | 6.28 (1.69) | 4.83 ** |
| H | 6.87 (1.25) | 6.82 (1.24) | 0.16 | 6.13 (1.38) | 6.44 (1.56) | 1.28 | 6.60 (1.29) | 6.60 (1.54) | 0.00 |
| I | 6.57 (1.19) | 5.11 (1.08) | 8.39 ** | 6.45 (1.41) | 5.73 (1.19) | 3.80 ** | 6.53 (1.14) | 5.48 (1.15) | 8.49 ** |
| J | 5.43 (1.28) | 4.90 (1.18) | 2.80 ** | 4.90 (1.80) | 5.09 (1.30) | 0.78 | 5.23 (1.46) | 5.01 (1.25) | 0.00 |
| N | 4.91 (1.24) | 5.82 (1.08) | 5.09 ** | 4.13 (1.45) | 5.77 (1.35) | 7.33 ** | 4.62 (1.36) | 5.79 (1.25) | 8.37 ** |
| O | 4.88 (1.00) | 4.38 (1.22) | 2.98 ** | 4.77 (1.36) | 4.81 (1.23) | 0.21 | 4.84 (1.16) | 4.63 (1.23) | 1.63 |
| Q ₃ | 6.81 (1.32) | 5.82 (1.19) | 5.16 ** | 7.05 (1.38) | 6.20 (1.66) | 3.35 ** | 6.90 (1.41) | 6.04 (1.48) | 5.52 ** |
| Q ₄ | 4.16 (1.20) | 4.47 (1.18) | 1.71 | 3.68 (1.59) | 4.58 (1.56) | 3.54 ** | 3.98 (1.39) | 4.53 (1.42) | 3.63 ** |

* significant at 5% level.

** significant at 1% level.

If there is significant differences in the personality profiles of male and female sportspersons, we can say the same about the male and female non-athletes. Table 4.3 also provides the *t*-ratios between mean stenscores of male and female non-athletes on all the factors. The mean stenscores of male and female non-athletes also differ significantly in case of 9 factors. In case of Factor C, Factor D, Factor H, Factor J, and Factor O, there are no significant difference in male and female non-athletes. Hence, in comparison to sportspersons, the male and female non-sportspersons have significant different scores on more number of personality factors.

Difference Between Sportspersons and Non-sportspersons with Respect to the 14 Factor of CPQ

In Chapter 1, we have hypothesised that there are significant differences in the personality characteristics between sportspersons and non-sportspersons. From our study, the results to test this hypothesis are presented in Table 4.4. From this table, it is evident that the sportspersons and non-sportspersons have scored significantly different only on Factor D, Factor F and Factor H. The sportspersons as a whole are less excitable. Similarly, the non-sportspersons are also less excitable. However, the sportspersons tend towards the excitable range, whereas the non-sportspersons to the phlegmatic range of the phlegmatic excitability scale and there is significant difference in the scores of these two groups.

We have already discussed that Factor F provides insight into disurgency-surgency dimension of personality. The sportspersons and the non-sportspersons have average scores on this scale which put these two groups on the surgency range. However, there are significant difference in the meanscores of these two groups. The non-athletes have scored significantly higher than the athletes on the surgency range.

Similarly, both athletes and non-athletes have scored more than the average on the thercitic-parmic scale, implying that both the groups fall in the parmic range. However, from Table 4.4 it is evident that the non-sportspersons have scored significantly higher than the sportspersons in the parmic range of this scale.

TABLE 4.4
Difference between Sportspersons and Non Sportsperson on
Different Factors of CPQ

| Factor | Sportspersons | | Non sportspersons | | t - ratio |
|----------------|---------------|------|-------------------|------|-----------|
| | M | S.D. | M | S.D. | |
| A | 4.86 | 1.20 | 4.63 | 1.75 | 0.12 |
| B | 5.00 | 1.42 | 4.79 | 2.17 | 1.07 |
| C | 6.10 | 1.16 | 5.99 | 1.61 | 0.73 |
| D | 4.11 | 1.12 | 4.41 | 1.52 | 2.12 * |
| E | 4.87 | 1.26 | 4.67 | 1.79 | 1.21 |
| F | 5.74 | 1.36 | 6.40 | 1.80 | 3.87 ** |
| G | 6.70 | 1.35 | 6.66 | 1.74 | 0.24 |
| H | 6.85 | 1.25 | 6.33 | 1.51 | 3.49 ** |
| I | 6.01 | 1.15 | 6.16 | 1.31 | 1.14 |
| J | 5.20 | 1.24 | 5.02 | 1.50 | 1.22 |
| N | 5.30 | 1.18 | 5.19 | 1.59 | 0.74 |
| O | 4.67 | 1.10 | 4.80 | 1.28 | 1.02 |
| Q ₃ | 6.39 | 1.27 | 6.50 | 1.62 | 0.71 |
| Q ₄ | 4.29 | 1.19 | 4.26 | 1.63 | 0.20 |

* significant at 5% level.

** significant at 1% level.

On Factor O, both these groups have scored less than the average, implying both groups are in the untroubled adequacy range of the factor. However, as there is significant differences in the mean stenscores of these two groups, it can be safely said that the athletes playing group games are having more untroubled adequacy than the players of individual games. Similarly, both these groups have scores in the positive self-sentiment range of Factor Q₄. However, as there is significant differences between their stenscores on this factor, it may be said that players of individual games have high positive self-sentiment than the players of group games in the phlegmatic range of the phlegmatic excitability scale and there is significant difference in the scores of these two groups.

Difference between Sportspersons Playing Team and Individual Games

It is sometimes hypothesised that there are significant difference in the personality profiles of athletes playing group games and individual games. We have hypothesised that there are no significant

difference between the sportspersons playing team and individual games. The results of the study are presented in Table 4.5. From this table, it is evident that there are significant differences between the mean stenscores of sportspersons playing group games and sportspersons playing individual games on Factor B, Factor C, Factor H, Factor O and Factor Q₃. On the intelligence scale, the athletes belonging to group games have scored less than the average implying they are less intelligent than the average. On the other hand the sportspersons playing individual games have more than average scores on the intelligence scale. The more important factor is that there significant difference in the scores by the two groups.

TABLE 4.5
Difference between sportspersons playing group and individual games

| Factor | Group games | | Individual games | | <i>t</i> - ratio |
|----------------|-------------|------|------------------|------|------------------|
| | M | S.D. | M | S.D. | |
| A | 5.03 | 1.65 | 5.28 | 1.21 | 1.11 |
| B | 4.25 | 2.42 | 5.80 | 1.67 | 4.86 ** |
| C | 6.93 | 1.54 | 7.38 | 1.24 | 2.11 * |
| D | 4.86 | 1.30 | 4.58 | 1.26 | 0.52 |
| E | 4.84 | 1.74 | 4.91 | 1.47 | 0.29 |
| F | 5.98 | 1.72 | 5.98 | 1.49 | 0.00 |
| G | 6.41 | 1.94 | 6.92 | 1.82 | 1.79 |
| H | 6.50 | 1.70 | 7.33 | 1.38 | 3.52 ** |
| I | 6.04 | 1.19 | 5.96 | 1.45 | 0.40 |
| J | 5.21 | 1.63 | 5.18 | 1.52 | 0.13 |
| N | 5.34 | 1.46 | 5.24 | 1.38 | 0.46 |
| O | 4.85 | 1.22 | 4.34 | 1.25 | 2.25 * |
| Q ₃ | 6.09 | 1.73 | 6.59 | 1.49 | 2.04 * |
| Q ₄ | 4.45 | 1.48 | 4.09 | 1.35 | 1.68 |

* significant at 5% level.

** significant at 1% level.

Factor C provides insight into the emotional stability dimension of personality. Both the groups of sportspersons are emotionally stable, the stenscores being 6.93 and 7.38. However, these mean stenscores are significantly different from each other implying the players of individual games are emotionally more stable than the players of group games.

The sportspersons belonging to group and individual games differ significantly on the thertic-parmic scale. Both these groups fall in the parmic range of this scale. However, the players of individual games are more parmic than the players of group games.

On Factor O, both these groups have scored less than the average, implying both groups are in the untroubled adequacy range of the factor. However, as there is significant difference in the mean stenscores of these two groups, it can be safely said that the athletes playing group games are having more untroubled adequacy than the players of individual games. Similarly, both these groups have scores in the positive self-sentiment range of Factor Q4. However, as there is significant difference between their stenscores on this factor, it may be said that players of individual games have high positive self-sentiment than the players of group games in the phlegmatic range of the phlegmatic excitability scale and there is significant difference in the scores of these two groups.

Difference in Psychological Characteristics of Sportspersons Playing Different Games

It is worthwhile to compare the psychological profiles of sportspersons playing a particular game with other sportspersons. The moot question here is whether players belonging to disciplines like athletes, football, volleyball, etc. are different from the entire sportspersons with respect to the psychological profiles as per CPQ. In order to know such difference, *t*-test was carried out between the mean stenscores of the group with mean stenscores of the population of sportspersons as a whole. This exercise was repeated for all the 14 factors.

The results are depicted in Tables 4.6, 4.7, 4.8, 4.9 and 4.10.

From Table 4.6, it is inferred that the mean stenscores on Factor A (sociability scale) of sportspersons belonging to athletics, badminton and gymnastics were significantly different from that of sportspersons as a whole. Though in case of sportspersons belonging to athletics and badminton have averagely scored on this scale, their scores are significantly different from all sportspersons. These groups are more sociable, warm hearted and outgoing than the sportspersons as a whole. On the other hand, the gymnastics group

differ significantly from the population of sportspersons. They are reserved, detached, critical and cool compared to sportspersons as a group who are moderately sociable and warm hearted.

TABLE 4.6
Difference in psychological characteristics of sportspersons
playing different games.

| Game | Factor A | | Factor B | | Factor C | |
|------|----------------|---------|----------------|---------|----------------|--------|
| | Mean | t | Mean | t | Mean | t |
| AT | 5.35 (1.35) | 3.56 ** | 5.73 (2.14) | 1.84 | 6.03 (1.32) | 0.29 |
| FB | 4.87 (1.79) | 6.02 | 6.35 (1.76) | 2.77 * | 5.21 (1.56) | 2.06 * |
| VB | 4.84 (1.67) | 0.06 | 3.96 (2.60) | 2.00 | 5.88 (0.91) | 1.21 |
| BD | 5.54 (0.80) | 2.94 ** | 5.83 (1.14) | 2.41 | 5.97 (1.19) | 0.36 |
| MA | 4.64 (1.28) | 0.89 | 6.41 (1.45) | 4.95 ** | 6.79 (1.31) | 0.35 |
| BB | 5.09 (1.50) | 0.67 | 4.89 (2.51) | 0.19 | 6.71 (1.45) | 1.78 |
| HC | 4.93 (1.69) | 0.25 | 3.56 (2.49) | 3.61 ** | 6.41 (1.85) | 1.05 |
| GM | 2.89 (0.70) | 9.33 ** | 4.67 (0.49) | 2.23 * | 5.67 (0.45) | 3.17 |

* significant at 5% level.

** significant at 1% level.

In case of Factor B, as Table 4.6 shows, 5 groups of athletes have significantly different scores than the universe of sportspersons as a whole. The athletes belonging to football, badminton, martial arts, hockey and gymnastics have significantly different intelligence scores than the sportspersons as a whole. The footballers, badminton players and athletes belonging martial arts are more intelligent than the sportspersons as a whole while, the athletes belonging to hockey and gymnastics are less intelligent than the sportspersons as a whole.

In case of Factor C, only two groups namely, the footballers and the gymnastic athletes have scored significantly different than the sportspersons as a group. Though, both these groups as well

as all sportspersons have scored more than the average implying all are in the emotional stability range, the footballers and gymnasts are emotionally stable as compared to the population of sportspersons. On the other hand, in case of Factor D, none of the individual groups have scored significantly different from all the sportspersons (Table 4.7).

TABLE 4.7
Difference in psychological Characteristics of Sportspersons
playing different Games.

| Game | Factor D | | Factor E | | Factor F | |
|------|----------------|------|----------------|---------|----------------|------|
| | Mean | t | Mean | t | Mean | t |
| AT | 4.28 (1.33) | 0.69 | 4.77 (1.52) | 0.35 | 5.57 (1.44) | 0.64 |
| FB | 4.12 (1.00) | 0.04 | 4.50 (1.99) | 0.51 | 4.24 (1.58) | 3.43 |
| VB | 4.16 (1.05) | 0.05 | 4.72 (1.87) | 2.35 * | 5.64 (1.84) | 0.27 |
| BD | 4.25 (1.64) | 0.43 | 4.00 (1.23) | 0.28 | 5.00 (1.08) | 2.27 |
| MA | 4.01 (1.01) | 0.50 | 4.96 (1.65) | 0.33 | 6.70 (1.76) | 2.78 |
| BB | 3.96 (1.38) | 0.43 | 5.00 (1.69) | 0.30 | 5.79 (1.15) | 0.18 |
| HC | 4.03 (1.48) | 0.34 | 4.95 (1.64) | 8.20 ** | 5.97 (1.93) | 0.74 |
| GM | 4.11 (1.05) | 0.00 | 6.45 (0.64) | 2.23 * | 5.33 (1.16) | 1.69 |

* significant at 5% level.

** significant at 1% level.

The badminton players and the gymnasts have scored significantly different stenscores than the population of sportspersons on Factor E. From this, it can be safely inferred that the gymnasts as a group are more dominant as compared to all sportspersons. On the other hand the badminton players are submissive compared to the averagely dominant trait of the sportspersons as a whole.

The footballers, athletes playing badminton and martial arts have significantly different stenscores as compared to all sportspersons on Factor F. The footballers are failing in the desurgency range of the factor while the sportspersons as a whole fall in the surgency range. The badminton players are neither desurgent nor surgent whereas the athletes belonging to martial arts are more surgent compared the mild surgency of all sportspersons.

With regard to the super-ego strength dimension of personality it may be seen from Table 4.8 that the athletes belonging to disciplines like martial arts and hockey have scored significantly different than the population of sportspersons. However both these groups as well as all sportspersons are in the high super-ego range of this scale.

TABLE 4.8
Difference in psychological characteristics of sportspersons
playing different games

| Game | Factor G | | Factor H | | Factor I | |
|------|----------------|---------|----------------|---------|----------------|--------|
| | Mean | t | Mean | t | Mean | t |
| AT | 6.93 (1.93) | 0.64 | 7.30 (1.27) | 1.91 * | 5.67 (1.42) | 1.29 |
| FB | 7.50 (2.38) | 1.21 | 7.21 (1.90) | 0.68 | 6.28 (1.30) | 0.75 |
| VB | 6.40 (1.81) | 0.83 | 6.24 (1.82) | 1.68 | 6.20 (1.02) | 0.75 |
| BD | 6.66 (2.60) | 0.05 | 6.89 (1.89) | 0.03 | 6.84 (1.61) | 1.71 |
| MA | 7.63 (1.42) | 3.34 ** | 7.78 (1.57) | 3.02 ** | 5.10 (1.24) | 3.74 * |
| BB | 6.89 (1.52) | 0.53 | 7.16 (1.92) | 0.68 | 5.89 (1.16) | 0.44 |
| HC | 5.91 (2.05) | 2.40 * | 6.14 (1.48) | 2.99 ** | 5.84 (1.27) | 0.83 |
| GM | 6.22 (0.90) | 1.77 | 6.44 (1.29) | 1.06 | 5.33 (1.93) | 1.17 |

* significant at 5% level.

** significant at 1% level.

TABLE 4.9
Difference in psychological characteristics of sportspersons
playing different games

| Game | Factor J | | Factor N | | Factor O | |
|------|----------------|---------|----------------|---------|----------------|------|
| | Mean | t | Mean | t | Mean | t |
| AT | 5.00 (1.48) | 0.73 | 5.20 (1.78) | 0.30 | 4.97 (1.03) | 1.05 |
| FB | 5.50 (1.50) | 0.72 | 5.22 (1.61) | 0.18 | 5.28 (1.10) | 2.00 |
| VB | 5.72 (1.25) | 2.08 * | 5.76 (1.45) | 1.59 | 4.64 (1.41) | 0.11 |
| BD | 6.00 (1.64) | 1.62 | 4.92 (1.11) | 1.14 | 5.08 (1.39) | 0.98 |
| MA | 5.33 (1.65) | 0.40 | 5.00 (1.05) | 1.46 | 4.19 (1.49) | 1.64 |
| BB | 5.10 (2.17) | 0.24 | 4.69 (1.13) | 2.29 * | 4.69 (0.92) | 0.09 |
| HC | 4.84 (1.60) | 0.95 | 5.40 (1.56) | 0.40 | 4.79 (1.28) | 0.59 |
| GM | 4.44 (0.76) | 6.24 ** | 6.23 (0.83) | 3.60 ** | 4.78 (0.83) | 0.44 |

* significant at 5% level.

** significant at 1% level.

For the first time in case of Factor H, the athletics group has scored significantly different than the sportspersons as a whole. Two more groups, the martial arts and hockey players, have also scored significantly different than the population of sportspersons. However, all these three groups as well as the population of sportspersons are in the parmic range of the scale. While the athletic and martial arts group are more parmic, the hockey players are less parmic than the population of sportspersons.

In case of Factor I, only one group namely, the athletes belonging to the martial arts group, has significantly different scores than the sportspersons as a whole. While this group is neither harric nor premsic, the sportspersons as a whole are moderately premsic (Table 4.9).

For the first time, the volley ball group has shown significantly different scores compared to the sportspersons as a whole in case of Factor J. The gymnasts have also significantly different scores than the population on Factor J. While the volley ball players are more coasthneric, the gymnasts are zeppic compared to the mildly coasthneric population of sportspersons.

The basket ball players and the gymnasts have scored significantly different scores compared to sportspersons as a whole on Factor N. While the gymnasts are shrewder, the basket ball players are naive compared to mild shrewdness of all sportspersons.

In case of Factor O, nine of the athletic groups have significantly different scores compared to the sportspersons as a whole. In case of Factor Q₃, the groups of athletics and hockey players have significantly different scores than the population of sportspersons (Table 4.10). However, these two groups as well as the sportspersons are in the positive range of this self-sentiment scale.

TABLE 4.10
Difference in psychological characteristics of sportspersons
playing different games

| Game | Factor Q ₃ | | Factor Q ₄ | |
|------|-----------------------|--------|-----------------------|------|
| | Mean | t | Mean | t |
| AT | 5.30 (1.63) | 3.60 * | 4.20 (1.44) | 0.34 |
| FB | 6.18 (1.59) | 0.48 | 4.36 (1.59) | 0.16 |
| VB | 6.00 (1.81) | 1.08 | 4.60 (1.50) | 1.03 |
| BD | 6.16 (1.34) | 0.57 | 4.59 (1.32) | 0.75 |
| MA | 6.02 (1.51) | 1.25 | 3.59 (1.31) | 2.73 |
| BB | 6.37 (1.98) | 0.04 | 4.10 (1.33) | 0.61 |
| HC | 5.88 (1.62) | 1.96 * | 4.49 (1.52) | 0.82 |
| GM | 5.89 (0.93) | 1.78 | 4.89 (1.16) | 1.72 |

significant at 5% level.

significant at 1% level.

TABLE 4.11
Means and Standard Deviations of Sportspersons and Non - sportspersons on different Factors in Phase II

| CODE | Mean & S.D. | No. of subjects | Fac. A | Fac. B | Fac. C | Fac. D | Fac. E | Fac. F | Fac. G | Fac. H | Fac. I | Fac. J | Fac. N | Fac. O | Fac. Q ₃ | Fac. Q ₄ |
|------|----------------|--------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|------------------------|------------------------|
| AT | Mean S.D. | 30 | 5.23 1.59 | 5.72 1.51 | 6.27 1.08 | 4.04 1.28 | 4.20 1.94 | 5.83 1.66 | 7.33 1.40 | 6.80 1.49 | 6.00 1.03 | 5.27 1.41 | 5.17 1.34 | 4.87 1.21 | 5.40 1.03 | 3.97 1.58 |
| FB | Mean S.D. | 14 | 5.07 1.33 | 5.91 1.28 | 5.43 1.12 | 4.71 1.22 | 2.79 1.15 | 4.43 1.05 | 6.79 1.74 | 6.57 1.45 | 7.36 0.89 | 5.64 1.59 | 4.64 1.04 | 4.79 0.94 | 6.57 1.40 | 4.14 1.30 |
| VB | Mean S.D. | 25 | 5.00 1.23 | 3.72 1.22 | 6.14 1.20 | 4.20 0.98 | 4.20 2.71 | 6.00 2.19 | 6.88 1.73 | 6.52 1.07 | 6.60 1.90 | 6.00 1.70 | 5.88 1.95 | 4.64 1.33 | 6.24 1.58 | 4.72 1.99 |
| BD | Mean S.D. | 12 | 6.00 1.22 | 5.25 1.78 | 6.41 1.19 | 3.92 1.49 | 3.84 1.40 | 4.92 1.32 | 7.25 1.92 | 6.33 1.11 | 7.08 1.70 | 5.33 1.32 | 5.08 1.15 | 5.00 1.35 | 7.00 1.57 | 4.16 1.33 |
| MA | Mean S.D. | 27 | 4.34 1.47 | 6.63 1.02 | 6.22 1.10 | 4.30 1.24 | 4.07 1.72 | 6.15 1.86 | 6.74 1.65 | 7.68 1.36 | 5.74 1.32 | 6.07 1.46 | 5.70 1.74 | 4.22 1.23 | 6.56 1.20 | 4.07 1.38 |
| BB | Mean S.D. | 19 | 5.00 1.17 | 4.14 1.23 | 6.63 0.98 | 4.26 1.30 | 4.21 1.85 | 5.48 2.16 | 6.10 1.55 | 6.68 1.17 | 6.00 1.03 | 5.31 1.59 | 5.16 1.50 | 4.90 1.21 | 6.63 1.09 | 4.16 0.99 |
| HC | Mean S.D. | 43 | 5.16 1.33 | 3.65 1.67 | 6.65 1.40 | 4.44 1.21 | 5.54 2.30 | 5.84 2.23 | 6.21 1.77 | 6.58 1.34 | 5.88 1.42 | 5.39 2.03 | 5.54 1.98 | 4.58 1.25 | 5.67 1.71 | 4.63 1.58 |
| GM | Mean S.D. | 9 | 3.10 1.73 | 4.89 1.81 | 5.87 0.83 | 4.45 1.18 | 7.78 0.83 | 6.44 1.29 | 6.11 1.36 | 6.33 1.28 | 5.55 1.92 | 4.66 0.99 | 6.67 1.20 | 4.89 0.88 | 5.44 1.50 | 4.93 0.93 |

But both these groups have significantly less positive self sentiment scores compared to the sportspersons as a whole. In case of Factor Q₄, only one group namely, the athletes belonging to the martial arts discipline, has significantly different scores than the population of sportspersons. Though both the sportspersons as a whole and the martial artists have scores in the threctic range of the scale, the latter are more threctic than the former.

Scores with Respect to Psychological Variables During Phase II, Phase III and Phase IV of Data Collection

The present study is a follow-up study designed for finding the significant differences in the scores on various psychological scales as per Cattell's children's Personality Questionnaire (CPQ) test. The test was administered to the sample of subjects four times at an interval of six months each. The previous section has already analysed the results of the first phase in detail. In the present section, the results of the four phases are compared so as to find any significant changes in the scores with respect to psychological variables. Tables 4.11 to 4.16 present the means and standard deviations of different groups for Phase II, Phase III and Phase IV respectively. When these results are compared with Table 4.1, which contains the results of Phase I, certain changes are discernible with respect to some psychological variables for different groups. However, to have a proper analysis and to know whether the changes between the initial and final scores with respect to psychological variables are significant or not, *t*-ratios between the initial and subsequent scores are computed. Tables 4.17 to 4.23 present such *t*-ratios alongwith the mean-stenscores and standard deviations for the four phases for the fourteen psychological factors as per CPQ. As the means of first and subsequent phases are correlated, one-tail test was applied. The results were discussed for each factor separately.

Significant Difference Between Initial and Final Scores on Different Psychological Attributes

Tables 4.17, 4.18, 4.19, 4.20, 4.21, 4.22, and 4.23 depict the *t*-ratios computed for the mean stenscores of different groups on all the 14

TABLE 4.12
Means and Standard Deviations of Sportspersons and Non-sportspersons on different Factors in Phase II

| Code | Mean & S.D. | No. of subjects | Fac. A | Fac. B | Fac. C | Fac. D | Fac. E | Fac. F | Fac. G | Fac. H | Fac. I | Fac. J | Fac. N | Fac. O | Fac. Q ₃ | Fac. Q ₄ |
|------------------------|----------------|--------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|------------------------|------------------------|
| All male S.P. | Mean S.D. | 103 | 5.19 1.29 | 6.84 1.25 | 6.14 1.12 | 4.18 1.01 | 3.12 1.31 | 4.44 1.30 | 7.23 1.28 | 6.77 1.13 | 6.79 1.21 | 5.33 1.15 | 4.69 1.18 | 4.71 1.08 | 6.95 1.08 | 4.41 1.36 |
| All female S.P. | Mean S.D. | 76 | 4.64 1.00 | 3.30 1.11 | 6.53 1.01 | 4.43 1.22 | 6.49 1.48 | 7.89 1.44 | 5.91 1.28 | 6.53 1.15 | 5.45 1.12 | 4.88 1.40 | 5.99 1.38 | 4.63 1.10 | 5.33 1.29 | 4.55 0.99 |
| All sports persons | Mean S.D. | 179 | 5.04 1.18 | 4.88 1.19 | 6.33 1.07 | 4.28 1.10 | 4.55 1.38 | 5.74 1.36 | 6.67 1.28 | 6.75 1.14 | 6.22 1.17 | 5.23 1.26 | 5.46 1.27 | 4.68 1.09 | 6.35 1.17 | 4.39 1.22 |
| All male N.S.P. | Mean S.D. | 59 | 5.37 1.15 | 5.61 1.96 | 6.17 1.82 | 4.63 1.77 | 4.25 1.72 | 4.69 1.38 | 7.01 1.99 | 6.10 1.66 | 6.95 1.28 | 4.81 1.65 | 4.33 1.62 | 4.85 1.42 | 7.01 1.76 | 3.73 1.76 |
| All female N.P. | Mean S.D. | 109 | 4.37 1.51 | 4.42 1.99 | 6.11 1.42 | 4.76 1.44 | 6.61 1.57 | 6.67 1.24 | 6.54 1.64 | 6.57 1.45 | 5.95 1.47 | 5.07 1.90 | 5.82 1.50 | 4.96 1.25 | 6.13 1.52 | 5.65 1.62 |
| All N.S.P. | Mean S.D. | 168 | 4.79 1.41 | 4.84 2.06 | 6.09 1.58 | 4.71 1.57 | 5.78 1.98 | 5.89 1.80 | 6.58 1.81 | 6.40 1.54 | 6.31 1.48 | 5.23 1.85 | 5.29 1.63 | 4.93 1.35 | 6.41 1.66 | 4.37 1.68 |
| All male subjects | Mean S.D. | 163 | 5.26 1.24 | 5.88 1.53 | 6.20 1.33 | 4.35 1.31 | 3.54 1.43 | 4.33 1.34 | 6.90 1.48 | 6.40 1.26 | 6.85 1.25 | 5.33 1.39 | 4.70 1.31 | 5.03 1.22 | 6.75 1.26 | 4.17 1.49 |
| All female subjects | Mean S.D. | 185 | 4.42 1.32 | 3.96 1.68 | 6.27 1.27 | 4.62 1.35 | 6.56 1.53 | 7.30 1.32 | 6.23 1.50 | 6.55 1.34 | 5.74 1.34 | 4.99 1.71 | 5.85 1.45 | 4.82 1.19 | 6.08 1.43 | 4.63 1.40 |
| All subjects | Mean S.D. | 348 | 4.87 1.29 | 4.86 1.61 | 6.29 1.30 | 4.49 1.33 | 5.13 1.48 | 5.83 1.33 | 6.61 1.48 | 6.46 1.30 | 6.26 1.30 | 5.17 1.57 | 5.39 1.39 | 4.83 1.21 | 6.40 1.35 | 4.31 1.44 |

TABLE 4.13
Means and Standard Deviations of sportspersons and Non-sportsperson
on different Factors in Phase III

| Code | Mean & S.D. | No. of subjects | Fac. A | Fac. B | Fac. C | Fac. D | Fac. E | Fac. F | Fac. G | Fac. H | Fac. I | Fac. J | Fac. N | Fac. O | Fac. Q ₃ | Fac. Q ₄ |
|------|--------------|-----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------------|---------------------|
| AT | Mean S.D. | 30 | 5.40 1.75 | 5.60 2.56 | 6.87 1.48 | 4.16 1.81 | 4.87 1.91 | 5.20 1.96 | 6.30 2.02 | 7.03 1.83 | 6.07 1.09 | 4.90 1.76 | 5.60 1.82 | 4.87 1.41 | 6.34 1.97 | 4.43 1.73 |
| FB | Mean S.D. | 14 | 4.93 1.83 | 6.01 1.57 | 5.42 2.29 | 5.21 1.02 | 2.93 1.63 | 4.45 1.45 | 6.50 1.81 | 6.50 1.45 | 6.50 0.82 | 5.35 1.63 | 5.21 1.52 | 5.35 1.54 | 5.71 1.54 | 5.28 1.28 |
| VB | Mean S.D. | 25 | 4.88 1.68 | 3.67 1.60 | 6.04 1.45 | 5.00 1.33 | 4.20 2.33 | 5.36 2.54 | 6.04 1.56 | 5.92 1.57 | 5.88 1.65 | 5.80 1.23 | 5.48 1.58 | 5.00 1.17 | 5.60 1.65 | 4.68 1.41 |
| BD | Mean S.D. | 12 | 6.50 2.15 | 5.75 2.22 | 6.87 2.10 | 3.67 1.55 | 3.84 1.15 | 5.42 2.25 | 5.75 2.01 | 6.16 2.03 | 6.83 0.80 | 5.33 2.21 | 4.67 1.55 | 5.32 1.97 | 6.08 1.93 | 3.59 1.55 |
| MA | Mean S.D. | 27 | 5.48 1.28 | 6.29 1.54 | 6.52 1.50 | 4.26 1.07 | 5.04 1.77 | 6.66 1.93 | 7.55 1.31 | 7.63 1.61 | 5.15 1.67 | 5.33 1.59 | 4.92 1.09 | 4.15 1.38 | 7.00 1.33 | 3.59 1.37 |
| BB | Mean S.D. | 19 | 5.95 1.28 | 4.73 2.63 | 7.16 1.23 | 4.47 1.35 | 5.00 1.97 | 5.84 1.26 | 6.79 1.60 | 7.10 2.00 | 6.27 0.91 | 4.49 2.09 | 4.95 1.36 | 4.84 1.31 | 6.37 2.00 | 4.21 1.24 |
| HC | Mean S.D. | 43 | 5.18 1.69 | 3.54 2.36 | 6.71 2.10 | 4.33 1.57 | 5.32 1.53 | 6.12 1.90 | 5.70 2.28 | 6.18 1.54 | 5.70 1.67 | 4.79 1.85 | 5.74 1.71 | 4.93 1.28 | 5.67 1.82 | 4.84 1.52 |
| GM | Mean S.D. | 9 | 4.00 0.99 | 4.52 0.73 | 6.74 0.88 | 4.22 0.35 | 6.33 1.05 | 6.45 1.55 | 6.11 1.03 | 6.44 1.99 | 4.22 1.46 | 3.44 0.93 | 6.11 0.88 | 5.00 1.28 | 6.22 1.31 | 4.67 0.64 |

TABLE 4.14
Means and Standard Deviations of sportspersons and Non-sportsperson
on different Factors in Phase III

| Code | Mean & S.D. | No. of subjects | Fac. A | Fac. B | Fac. C | Fac. D | Fac. E | Fac. F | Fac. G | Fac. H | Fac. I | Fac. J | Fac. N | Fac. O | Fac. Q ₃ | Fac. Q ₄ |
|---------------------|--------------|-----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------------|---------------------|
| All male S.P. | Mean S.D. | 103 | 5.41 1.34 | 6.26 1.08 | 6.81 1.37 | 4.57 1.29 | 4.04 1.33 | 4.58 1.02 | 6.59 1.07 | 6.66 1.37 | 6.63 1.27 | 5.63 1.36 | 4.90 1.15 | 4.96 1.24 | 6.83 1.35 | 4.18 1.21 |
| All female S.P. | Mean S.D. | 76 | 5.13 1.14 | 3.13 1.78 | 6.34 1.16 | 4.21 0.96 | 5.78 1.30 | 7.35 1.75 | 5.89 1.62 | 6.59 1.22 | 5.01 1.00 | 4.66 1.20 | 6.03 1.32 | 4.63 1.07 | 5.67 1.26 | 4.78 1.16 |
| All sports persons | Mean S.D. | 179 | 5.29 1.26 | 5.15 1.42 | 6.57 1.29 | 4.42 1.16 | 4.78 1.32 | 5.76 1.38 | 6.29 1.33 | 6.56 1.31 | 5.83 1.16 | 5.06 1.30 | 5.38 1.22 | 4.82 1.07 | 6.11 1.31 | 4.43 1.19 |
| All male N.S.P. | Mean S.D. | 60 | 5.33 1.27 | 5.83 1.88 | 6.40 1.62 | 4.35 1.63 | 3.95 1.50 | 4.53 1.44 | 7.03 1.49 | 6.22 1.27 | 6.51 0.96 | 4.90 1.81 | 4.42 1.42 | 4.55 1.44 | 7.05 1.32 | 3.72 1.61 |
| All female N.S.P. | Mean S.D. | 108 | 4.56 1.65 | 4.30 2.23 | 6.19 1.68 | 4.42 1.35 | 5.36 1.44 | 6.77 1.58 | 6.34 1.62 | 6.63 1.54 | 5.71 1.47 | 4.84 1.49 | 5.88 1.40 | 4.82 1.28 | 6.28 1.47 | 4.67 1.36 |
| All N.S.P. | Mean S.D. | 168 | 4.84 1.73 | 4.85 2.24 | 6.27 1.66 | 4.40 1.46 | 4.86 1.61 | 5.97 1.87 | 6.59 1.61 | 6.56 1.45 | 6.13 1.63 | 4.86 1.61 | 5.36 1.57 | 4.72 1.35 | 6.55 1.47 | 4.33 1.52 |
| All male subjects | Mean S.D. | 163 | 5.38 1.31 | 6.10 1.49 | 6.66 1.60 | 4.49 1.45 | 4.01 1.45 | 4.56 1.20 | 6.75 1.28 | 6.50 1.39 | 6.60 1.21 | 5.19 1.49 | 4.72 1.26 | 4.81 1.37 | 6.82 1.39 | 4.01 1.45 |
| All female subjects | Mean S.D. | 185 | 4.80 1.46 | 3.82 2.06 | 6.25 1.49 | 4.33 1.21 | 4.53 1.39 | 7.01 1.65 | 6.16 1.62 | 6.61 1.42 | 5.57 1.30 | 4.77 1.38 | 5.94 1.37 | 4.74 1.20 | 6.09 1.39 | 4.72 1.28 |
| All subjects | Mean S.D. | 348 | 3.07 1.40 | 4.89 1.81 | 6.44 1.54 | 4.41 1.32 | 4.82 1.41 | 5.86 1.46 | 6.43 1.47 | 6.56 1.40 | 5.83 1.26 | 4.96 1.43 | 5.37 1.32 | 4.77 1.28 | 6.43 1.39 | 4.39 1.36 |

TABLE 4.15
Means and Standard Deviations of Sportspersons and Non-sportspersons
on different Factors in Phase IV

| Code | Mean & No. of S.D. subjects | Fac. A | Fac. B | Fac. C | Fac. D | Fac. E | Fac. F | Fac. G | Fac. H | Fac. I | Fac. J | Fac. N | Fac. O | Fac. Q ₃ | Fac. Q ₄ |
|------|--------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------------|---------------------|
| AT | Mean S.D. | 6.15 1.62 | 5.69 1.61 | 7.10 1.38 | 5.29 1.70 | 5.87 2.16 | 6.01 2.14 | 5.94 1.90 | 6.96 1.54 | 5.67 1.42 | 5.70 1.57 | 6.27 1.75 | 5.44 1.63 | 6.56 1.76 | 5.10 1.70 |
| FB | Mean S.D. | 5.58 0.98 | 5.84 0.83 | 6.67 0.94 | 5.28 1.39 | 3.15 1.50 | 4.79 1.55 | 6.28 1.33 | 5.21 1.32 | 6.28 1.30 | 6.15 1.55 | 6.32 1.00 | 6.15 0.89 | 6.57 0.96 | 4.71 1.33 |
| VB | Mean S.D. | 5.75 1.10 | 3.96 0.82 | 6.87 1.58 | 4.97 0.95 | 3.48 1.60 | 5.79 2.21 | 6.80 1.65 | 6.16 1.19 | 6.20 1.02 | 5.32 1.05 | 6.75 1.45 | 5.44 1.36 | 6.90 1.34 | 4.24 1.31 |
| BD | Mean S.D. | 6.54 1.31 | 5.85 0.86 | 7.81 1.72 | 5.72 1.00 | 4.08 1.32 | 4.84 1.14 | 4.67 1.25 | 6.27 1.47 | 6.84 1.61 | 6.00 1.16 | 6.33 1.18 | 6.34 1.28 | 7.19 1.07 | 6.33 1.43 |
| MA | Mean S.D. | 5.69 1.39 | 6.70 0.71 | 6.95 1.30 | 4.84 1.19 | 4.85 1.67 | 5.78 1.93 | 6.04 1.50 | 5.70 1.36 | 5.10 1.24 | 5.70 1.86 | 6.11 1.31 | 4.93 1.12 | 7.31 1.33 | 5.22 1.26 |
| BB | Mean S.D. | 6.15 1.41 | 4.82 0.89 | 7.64 1.17 | 4.87 1.72 | 3.37 1.49 | 5.00 1.83 | 6.53 1.53 | 7.05 1.23 | 5.89 1.16 | 5.37 1.04 | 5.10 1.30 | 5.10 1.12 | 6.46 1.30 | 4.47 1.27 |
| HC | Mean S.D. | 5.83 1.34 | 3.73 1.73 | 7.24 1.29 | 4.61 1.23 | 4.42 1.69 | 6.03 1.56 | 6.79 1.41 | 6.81 1.25 | 5.84 1.27 | 5.07 1.47 | 5.58 1.65 | 4.79 1.44 | 6.81 1.64 | 4.93 1.28 |
| GM | Mean S.D. | 3.55 1.76 | 4.34 0.49 | 6.96 0.99 | 4.98 1.05 | 5.44 1.07 | 6.57 1.05 | 6.56 0.90 | 6.67 0.64 | 5.33 1.93 | 4.77 1.58 | 6.89 0.90 | 5.89 0.64 | 6.84 1.16 | 5.78 1.51 |

TABLE 4.16
Means and Standard Deviations of Sportspersons and Non-sportspersons
on different Factors in Phase IV

| Code | Mean & S.D. | No. of subjects | Fac. A | Fac. B | Fac. C | Fac. D | Fac. E | Fac. F | Fac. G | Fac. H | Fac. I | Fac. J | Fac. N | Fac. O | Fac. Q ₃ | Fac. Q ₄ |
|---------------------|-------------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------------------|---------------------|
| All male S.P. | Mean | 103 | 5.80 | 6.31 | 6.43 | 4.98 | 3.60 | 4.51 | 6.24 | 6.85 | 6.57 | 5.76 | 5.04 | 5.33 | 6.32 | 4.68 |
| | S.D. | | 1.24 | 1.11 | 1.19 | 1.19 | 1.02 | 1.17 | 1.27 | 1.17 | 1.19 | 1.30 | 1.23 | 1.22 | 1.16 | 1.31 |
| All female S.P. | Mean | 76 | 5.69 | 3.23 | 6.76 | 5.05 | 5.55 | 7.33 | 6.42 | 6.60 | 5.11 | 5.03 | 6.35 | 4.56 | 6.89 | 5.39 |
| | S.D. | | 1.06 | 0.99 | 1.09 | 1.07 | 1.57 | 1.52 | 1.16 | 1.08 | 1.08 | 1.04 | 1.13 | 0.99 | 1.23 | 0.96 |
| All sports persons | Mean | 179 | 5.75 | 5.00 | 7.14 | 5.01 | 4.43 | 5.71 | 6.32 | 6.80 | 6.01 | 5.45 | 5.60 | 5.00 | 6.85 | 4.98 |
| | S.D. | | 1.17 | 1.06 | 1.15 | 1.14 | 1.29 | 1.33 | 1.22 | 1.13 | 1.15 | 1.20 | 1.19 | 1.13 | 1.19 | 1.17 |
| All male N.S.P. | Mean | 58 | 5.02 | 6.05 | 6.76 | 4.67 | 4.23 | 4.88 | 6.31 | 5.91 | 6.45 | 5.33 | 5.38 | 5.41 | 6.48 | 4.47 |
| | S.D. | | 1.59 | 2.13 | 1.94 | 1.73 | 1.76 | 1.46 | 1.67 | 1.60 | 1.14 | 1.58 | 1.42 | 1.70 | 1.58 | 1.97 |
| All female N.S.P. | Mean | 111 | 4.52 | 3.88 | 6.25 | 4.58 | 5.23 | 7.00 | 6.02 | 6.68 | 5.73 | 4.88 | 6.30 | 4.52 | 5.67 | 4.90 |
| | S.D. | | 1.38 | 2.69 | 1.60 | 1.38 | 1.77 | 1.46 | 1.38 | 1.36 | 1.19 | 1.63 | 1.43 | 1.33 | 1.48 | 1.49 |
| All N.S.P. | Mean | 169 | 4.69 | 4.62 | 6.20 | 4.61 | 5.51 | 6.27 | 6.12 | 6.42 | 6.16 | 5.03 | 5.98 | 4.83 | 5.95 | 4.75 |
| | S.D. | | 1.47 | 2.71 | 1.73 | 1.51 | 1.89 | 1.77 | 1.49 | 1.49 | 1.31 | 1.63 | 1.49 | 1.53 | 1.56 | 1.68 |
| All male subjects | Mean | 163 | 5.51 | 6.21 | 6.55 | 4.87 | 3.83 | 4.65 | 6.27 | 6.50 | 6.53 | 5.60 | 5.17 | 5.36 | 6.61 | 4.60 |
| | S.D. | | 1.38 | 0.88 | 0.95 | 0.95 | 0.81 | 0.93 | 1.01 | 0.93 | 1.14 | 1.03 | 0.98 | 0.97 | 0.92 | 1.04 |
| All female subjects | Mean | 183 | 5.00 | 3.61 | 6.46 | 4.77 | 5.36 | 7.13 | 6.18 | 6.65 | 5.48 | 4.94 | 6.32 | 4.54 | 6.23 | 5.10 |
| | S.D. | | 1.26 | 2.16 | 1.41 | 1.26 | 1.69 | 1.49 | 1.29 | 1.25 | 1.15 | 1.42 | 1.32 | 1.20 | 1.38 | 1.30 |
| All subjects | Mean | 348 | 5.24 | 4.83 | 6.50 | 4.82 | 4.65 | 5.97 | 6.22 | 6.40 | 5.97 | 5.25 | 5.78 | 4.92 | 6.40 | 4.78 |
| | S.D. | | 1.32 | 1.69 | 1.22 | 1.13 | 1.35 | 1.26 | 1.17 | 1.11 | 1.14 | 1.25 | 1.17 | 1.10 | 1.19 | 1.19 |

factors of CPQ. In these tables, t_{12} refers to t -ratio between mean stenscores of Phase I and Phase II of the data collection. As we have already discussed in Chapter III, such data are collected after a gap of 6 months. Similarly, t_{13} and t_{14} refers to t -ratios between mean stenscores of Phase I and Phase III and Phase I and Phase IV of data collection respectively.

Tables 4.17, 4.21 present t -ratios for the 8 groups of sportspersons while Table 4.22 presents the t -ratios for the male and female as well as the entire group of sportspersons. Table 4.23 presents such data for the male as well as female non-athletes for the 4 phases of data collection.

Significant Difference in the Mean Stenscores of Four Phases of Data Collection Pertaining to Different Groups of Sportspersons

The present study has taken 8 groups of athletes numbering 176 for the follow-up study. This group may be referred as the experimental group. The groups of athletes belonging to disciplines like athletics, football, volleyball, badminton, martial arts, basket ball, hockey and gymnastics were undergoing rigorous physical activities and were participating in competitive sports events. Those were selected young sportspersons chosen by Sports Authority of India and kept in residential schools for intensive sports coaching. As we have discussed in Chapters I and II, there are theoretical as well as empirical validation for constructing the hypothesis that such rigorous competitive sports participation and rigorous physical activity do have effects on the personality profiles of the subjects. Moreover, these young sportspersons were in the adolescent days of their formative years. With an objective to compare the significant changes in the personality profiles of sportspersons with the changes in such profiles of non-athletes, a control-group of 169 non-sportspersons from the same schools were also chosen. We will first discuss the significant changes in mean stenscores of each athletic group in all psychological characteristics as per CPQ before embarking upon a comparison of the changes with respect to sportspersons as a whole and non-sportspersons.

Tables 4.17 to 4.21 present t -ratios t_{12} , t_{13} and t_{14} for all the factors for all groups of sportspersons. From these tables, it is clear that no t_{12} is significant for any of the factors. Hence,

one can safely state that after training, coaching, rigorous physical activities and competitive participation for six months, there are no significant changes in the personality profiles (or any of the factors of CPQ) of the athletic group. This is universally true for all other athletic groups like sportspersons belonging to football, volleyball, badminton, martial arts, basket ball, hockey and gymnastics.

TABLE 4.17
Difference Between Scores on Different Factors
for Different Groups for the Four Phases
of Data Collection

| Game | Factor A | | | Factor B | | | Factor C | | |
|------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | t_{12} | t_{13} | t_{14} | t_{12} | t_{13} | t_{14} | t_{12} | t_{13} | t_{14} |
| AT | 0.36 | 0.09 | 2.48 | 0.03 | 0.32 | 0.08 | 1.35 | 2.15 * | 2.83 ** |
| FB | 0.34 | 0.11 | 1.24 | 0.76 | 0.52 | 0.88 | 0.37 | 0.29 | 2.79 ** |
| VB | 0.39 | 0.11 | 3.03 | 0.41 | 0.53 | 0.00 | 0.75 | 0.51 | 2.77 ** |
| BD | 1.10 | 1.53 | 2.73 | 0.96 | 0.11 | 0.04 | 0.91 | 1.04 | 2.55 * |
| MA | 0.81 | 4.17 ** | 2.66 | 0.66 | 1.18 | 0.91 | 0.09 | 2.85 ** | 2.47 * |
| BB | 0.21 | 3.84 ** | 3.25 | 1.18 | 1.06 | 0.11 | 0.20 | 2.89 ** | 2.66 * |
| HC | 0.69 | 0.93 | 2.85 | 0.20 | 0.23 | 0.43 | 0.68 | 2.03 * | 2.65 ** |
| GK | 1.11 | 4.45 | 1.34 | 0.35 | 0.79 | 1.13 | 0.44 | 2.83 * | 2.93 * |

* significant at 5% level.

** significant at 1% level.

We may now compare the results of Phase I and Phase III for all the 8 groups of athletes. From the matrix of 8 X 14 (112) t -ratios as depicted in Tables 4.17 to 4.21, only 22 t -ratios are found significant either at 5% or 1% level. Nevertheless, after a time gap of one year and physical activities described above, certain athletic groups have scored significantly different on the psychological scales as per CPQ. It is worthwhile to delineate the groups which have scored significantly different with respect to different factors.

With regard to Factor A only 3 groups out of 8, have scored significantly different scores at the end of Phase III as compared to Phase I i.e., the initial starting period. The athletes belonging to disciplines like martial arts, basket ball and hockey have scored significantly different on factor A at the end of Phase III as compared Phase I. We may refer back to Tables 4.1 and 4.9 which will give the direction of the changes. From these tables, it will be found that these three groups have universally moved toward high scores on the sociability score.

TABLE 4.18
Difference Between Scores on Different Factors for Different Groups
for the Four Phases of Data Collection

| <i>Game</i> | <i>Factor D</i> | | | <i>Factor - E</i> | | | <i>Factor F</i> | | |
|-------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | <i>t₁₂</i> | <i>t₁₃</i> | <i>t₁₄</i> | <i>t₁₂</i> | <i>t₁₃</i> | <i>t₁₄</i> | <i>t₁₂</i> | <i>t₁₃</i> | <i>t₁₄</i> |
| AT | 0.73 | 0.41 | 2.52 * | 1.26 | 0.30 | 2.97 | 0.65 | 0.98 | 1.08 |
| FB | 1.40 | 4.03 ** | 2.64 * | 1.79 | 2.41 * | 2.41 | 0.38 | 1.31 | |
| VB | 0.14 | 3.19 * | 2.67 * | 0.79 | 1.82 | 2.61 | 0.63 | 0.79 | 0.51 |
| BD | 0.52 | 0.90 | 2.52 * | 0.31 | 0.27 | -0.30 | 0.16 | 0.56 | 0.37 |
| MA | 0.93 | 1.65 | 2.61 * | 1.95 | 0.46 | 0.29 | 0.75 | 0.23 | 1.94 |
| BB | 0.69 | 2.45 * | 2.82 * | 1.38 | 0.00 | 3.33 | 0.56 | 0.34 | 1.93 |
| HC | 1.41 | 2.46 * | 3.06 ** | 1.36 | 2.61 * | 1.62 | 0.30 | 1.08 | 0.23 |
| GK | 0.64 | 0.36 | 2.30 * | 1.82 | 0.23 | 2.27 | 0.19 | 0.15 | 0.55 |

* Significant at 5% level.

** Significant at 1% level.

As regards to Factor B, which provides the intelligence dimension of personality, none of the groups have scored significantly different scores in Phase III as compared to Phase I. In case of Factor C, 5 groups out of 8 have scored significantly different at the

end of Phase III as compared to the initial phase. The athletics belonging to foot ball, volleyball and badminton groups have not shown such significant changes. When these *t*-ratios between mean stenscores of Phase I and Phase III are read with mean stenscores of these two phases of data collection in Tables 4.1, 4.11 it becomes evident that the mean stenscores have universally increased for all these 5 groups. The sportspersons belonging to all these 5 groups athletics, martial arts, basket ball, hockey and gymnastics have moved higher on the emotional stability scale at the end of Phase III as compared to the pre-training period.

In case of Factor D, the mean stenscores of athletes belonging to disciplines like football, volleyball, basketball, and hockey have significantly different stenscores at the end of Phase III as compared to the initial period. The footballers as a group have become mildly excitable as compared to their moderately phlegmatic characteristics in the initial, pre-training period. The other three groups namely, the volley ball, basket ball and hockey groups, have become less phlegmatic implying a movement towards the excitability range of this scale.

The athletes belonging to the football and hockey groups have scored significantly different at the end of Phase II of data collection as compared to the pre-training scores on Factor E. The hockey groups have scored significantly higher on this scale whereas the football group has scored significantly lower. None of the other 6 groups have any significant difference in the stenscores at the end of Phase III of data collection.

As regards to the desurgency-surgency scales (Factor F), super ego strength (Factor G) and threctic-parmic (Factor), it is found the (Table 4.18.) that none of the athlete groups have scored significantly different after 12 months of training, rigorous physical activity and competitive sports on any of the factors as per CPQ.

In case of Factor I, two groups belonging to disciplines like football and martial arts scored significantly different in Phase III as compared to Phase I. In case of the football group, it is universal reduction of scores on the harric-premsic scale. The footballers have become less premsic after the 12 months of training, physical activity and competitive sports (Table 4.19).

TABLE 4.19
Difference Between Scores on Different factors for different
Groups for the Four Phases of Data Collection

| Game | Factor G | | | Factor H | | | Factor I | | |
|------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | t ₁₂ | t ₁₃ | t ₁₄ | t ₁₂ | t ₁₃ | t ₁₄ | t ₁₂ | t ₁₃ | t ₁₄ |
| AT | 0.92 | 1.85 | 1.69 | 1.39 | 0.82 | 0.95 | 1.21 | 1.34 | 2.97 ** |
| FB | 0.90 | 1.14 | 1.65 | 1.01 | 1.05 | 0.01 | 0.54 | 3.26 ** | 1.69 |
| VB | 0.96 | 1.15 | 0.91 | 0.66 | 0.78 | 0.17 | 0.82 | 1.46 | 3.12 ** |
| BD | 0.63 | 0.86 | 1.10 | 1.07 | 1.11 | 0.93 | 0.01 | 0.45 | 2.42 * |
| MA | 1.42 | 0.66 | 4.66 ** | 0.67 | 1.55 | 0.21 | 0.12 | 6.75 ** | 2.56 * |
| BB | 1.58 | 0.56 | 0.71 | 0.91 | 0.20 | 0.25 | 1.10 | 0.46 | 2.84 * |
| HC | 0.73 | 1.53 | 2.27 * | 1.44 | 0.46 | 2.43 * | 0.44 | 0.32 | 4.08 ** |
| GK | 0.20 | 0.24 | 0.77 | 0.19 | 0.00 | 0.50 | 1.37 | 0.44 | 1.10 |

* Significant at 5% level,

** significant at 1% level.

The gymnasts are the only group showing significant different stenscores in Factor J in Phase III as compared to the initial period. This group has secured significantly lower on well as third phase, this group remains in zeppic zone of the zeppic-coasthenia scale (Factor J) of CPQ.

TABLE 4.20
Difference Between Scores on Different Factors for Different
Groups for the Four Phases of Data Collection

| Game | Factor J | | | Factor N | | | Factor O | | |
|------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | t ₁₂ | t ₁₃ | t ₁₄ | t ₁₂ | t ₁₃ | t ₁₄ | t ₁₂ | t ₁₃ | t ₁₄ |
| AT | 0.71 | 0.24 | 1.73 | 0.08 | 1.64 | 2.61 ** | 1.38 | 2.32 * | 2.76 ** |
| FB | 0.23 | 0.30 | 1.12 | 1.13 | 0.00 | 2.51 * | 1.28 | 0.14 | 2.95 * |
| VB | 0.66 | 0.26 | 1.00 | 0.25 | 0.86 | 2.53 * | 0.01 | 1.17 | 2.46 ** |
| BD | 1.11 | 0.81 | 0.00 | 0.32 | 0.54 | 2.93 * | 0.16 | 0.69 | 2.81 * |
| MA | 1.75 | 0.00 | 0.80 | 0.80 | 0.56 | 3.17 ** | 0.09 | 0.39 | 2.64 * |
| BB | 0.34 | 0.38 | 0.45 | 1.10 | 1.22 | 1.01 | 0.61 | 1.02 | 1.58 |
| HC | 1.41 | 0.32 | 0.69 | 0.37 | 2.16 * | 4.49 ** | 0.77 | 0.83 | 0.01 |
| GK | 0.53 | 3.71 ** | 0.51 | 0.90 | 0.45 | 2.44 * | 0.27 | 0.87 | 2.72 * |

* significant at 5% level.

** significant at 1% level.

The hockey players are the only group to score significantly different in Phase III as compared to Phase I on the naivete - shrewdness scale (Factor N). The group has become shrewed after 12 months of training from a near neutral position on this scale.

In case of Factor O, the athletics group scored significantly different after the 12 months of training. This group has moved in

the untroubled adequacy range of the scale. They have a little less untroubled adequacy after this length of training (Table 4.20).

TABLE 4.21
Difference Between Scores on Different Factors for Different
Groups for the Four Phases of Data Collection

| Game | Factor Q ₃ | | | Factor Q ₄ | | |
|------|-----------------------|-----------------|-----------------|-----------------------|-----------------|-----------------|
| | t ₁₂ | t ₁₃ | t ₁₄ | t ₁₂ | t ₁₃ | t ₁₄ |
| AT | 1.25 | 3.33 ** | 2.75 ** | 0.59 | 0.70 | 2.22 * |
| FB | 0.69 | 0.91 | 0.98 | 0.39 | 2.31 * | 0.75 |
| VB | 0.50 | 1.18 | 2.82 ** | 0.24 | 0.23 | 0.93 |
| BD | 1.53 | 0.11 | 2.86 * | 0.71 | 2.16 | 2.88 * |
| MA | 1.44 | 8.43 ** | 4.43 ** | 1.31 | 0.00 | 4.11 ** |
| BB | 0.51 | 0.01 | 0.23 | 0.14 | 0.73 | 1.00 |
| HC | 0.58 | 1.52 | 3.93 ** | 0.40 | 2.79 ** | 1.46 |
| GK | 0.76 | 0.59 | 2.38 * | 1.25 | 0.42 | 1.51 |

* significant at 5% level.

** significant at 1% level.

The athletics and the martial arts groups scored significantly different in Factor Q₃ (self-sentiment scale) after the 12 months of training. The movement of this score is from moderately positive self-sentiment to higher positive self-sentiment on this scale. In case Factor Q₄, (engic-tension scale), the athletes belonging to two disciplines, football and hockey, have scored significantly different after Phase III as pre-training period (Table 4.21).

The scores have moved universally in the positive direction implying that at the end of the training, rigorous physical activity and competitive participation of 18 months, these groups of athletes have become more sociable. Similarly, all groups have scored significantly different on the emotional stability scale at the end of Phase IV as compared to Phase I. All these groups have become more emotionally stable after the 18 months of competitive sports environment. All the *t*-ratios between the mean stenscores of Phase IV and Phase I are significant for Factor D also. All the movements of stenscores are in the positive direction for all the athlete groups implying the different groups of sportspersons has become less phlegmatic compared to the pre-training period.

The athlete groups belonging to disciplines like athletics, football, volleyball and basket ball have scored significantly different on Factor E at the end of the 18 months as compared to the pre-training period. However, the direction of movement is not

universally the same in case of all the athlete groups. In case of the athletics group, the movement is from near neutral position to mildly dominant position. In case of all other groups, the movement is from submissiveness to more submissiveness. In case of Factor G, only two groups, namely the martial arts and hockey players, scored significantly different at the end of Phase IV as compared to Phase I. In case of the martial arts groups the movement is on from high super-ego score to moderately high super-ego strength and in case of hockey players, the movement is from moderately super-ego strength to moderately high superego-strength.

In case of Factor H, only one group namely, the hockey players, scored significantly different after the 18 months of training as compared to the pre-training period. The movement of the mean stenscores is from moderate parmic range to moderately high parmic range on this scale.

The t -ratios (t_{14}) between mean stenscores of Phase IV and Phase I on Factor I are significant at either 5% or 1% level for all athlete groups except the football and gymnastic groups. The scores have moved in the same direction, from mild premsic range to moderate premsic range on this factor.

In case of Factor N, barring one group, namely the basket ball players, all the athlete groups have scored significantly different at the end of the 18 months training compared to the pre-training period. All the movements of the stenscores are in the same direction, i.e., the sportspersons belonging to all these groups have moved from neutral position to mildly shrewed position on this scale.

In case of Factor O, the athletes belonging to disciplines like basket ball and hockey did not score significantly different in Phase IV as compared to Phase I. All other groups have moved in the same direction—from untroubled adequacy to near neutral positions on this scale.

Barring athletes belonging to disciplines like football and basket ball, all other groups have scored significantly higher in Phase IV on the self-sentiment scale (Factor Q₃). All the movements of mean stenscores are from mildly positive self-sentiment to moderately positive-sentiment in this scale.

In case of Factor Q₄, athletes belonging to disciplines like athletics, badminton and martial arts have scored significantly

higher in Phase IV as compared to the initial phase. All these groups have become more ergic-tension after the 18 months of training as compared to the pre-training period.

Significant Changes in Psychological Attributes of Sports Persons after 18 Months of Competitive Sports, Rigorous Physical Activity and Training

The experimental group, the sportspersons numbering 179 underwent 18 months of rigorous physical activity, training by nationally selected coaches and competitive sports participation. To know the significant changes that has occurred during the period under study, *t*-ratios between the mean stenscores of Phase I on one hand and the mean stenscores of Phase II, Phase III and Phase IV respectively (t_{12} , t_{13} , t_{14}) were computed. Table 4.22 presents such *t*-ratios both for the male and female sportspersons as well as for the sportspersons as a whole.

TABLE 4.22
Difference Between Scores of Sportspersons on Different Factors for the Four Phases of Data Collection

| Factor | Male | | | Female | | | Total | | |
|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | t_{12} | t_{13} | t_{14} | t_{12} | t_{13} | t_{14} | t_{12} | t_{13} | t_{14} |
| A | 0.05 | 1.49 | 3.74 ** | 1.70 | 5.61 ** | 8.82 ** | 1.41 | 4.39 ** | 8.05 ** |
| B | 1.14 | 0.08 | 0.44 | 0.00 | 0.87 | 0.40 | 0.87 | 1.45 | 0.06 |
| C | 1.17 | 6.61 ** | 5.06 ** | 1.34 | 0.11 | 4.41 ** | 0.85 | 5.08 ** | 14.82 ** |
| D | 2.23 | 0.36 | 3.75 ** | 2.03 | 6.84 ** | 12.93 ** | 1.52 | 4.05 ** | 10.66 ** |
| E | 1.76 | 1.97 * | 5.20 ** | 1.45 | 0.94 | 0.78 | 1.28 | 1.13 | 2.32 * |
| F | 0.54 | 5.27 ** | 3.70 ** | 1.31 | 4.59 ** | 4.63 ** | 0.26 | 0.23 | 0.78 |
| G | 0.07 | 6.46 ** | 8.27 ** | 0.56 | 0.99 | 3.79 ** | 0.23 | 4.92 ** | 3.96 ** |
| H | 1.23 | 1.85 | 0.17 | 1.49 | 1.86 | 1.66 | 1.36 | 3.46 * | 0.57 |
| I | 0.35 | 2.00 * | 5.00 ** | 0.91 | 2.88 ** | 1.07 | 1.46 | 2.68 ** | 3.51 ** |
| J | 1.42 | 0.57 | 2.29 * | 0.10 | 1.86 | 1.14 | 0.96 | 1.59 | 0.97 |
| M | 1.30 | 0.11 | 1.19 | 1.42 | 2.00 * | 4.62 ** | 1.29 | 1.26 | 3.78 ** |
| O | 1.17 | 0.81 | 4.54 ** | 1.32 | 2.14 * | 1.56 | 0.07 | 2.05 * | 4.55 ** |
| Q 3 | 0.83 | 0.22 | 0.10 | 1.44 | 1.56 | 9.45 ** | 0.33 | 4.31 * | 6.15 ** |
| Q 4 | 1.09 | 0.24 | 4.98 ** | 1.19 | 3.25 ** | 8.68 ** | 0.79 | 2.27 * | 9.37 ** |

* significant at 5% level.

** significant at 1% level.

From Table 4.22, it is evident that none of the t_{12} 's for any group—male, female or whole—and for any factor is significant. Hence one may say that after 6 months of training, physical activity and competitive sports, the sportspersons did not exhibit any significant change in their scores on the various psychological attributes of CPQ.

The t -ratios between mean stenscores of male sportspersons for Phase I and Phase III on Factor C, Factor E, Factor F, Factor G and Factor I are significant at either 5% or 1% level. Similarly, t_{13} 's for female sportspersons for Factor A, Factor D, Factor F, Factor I, Factor N, Factor O and Factor Q₄ are significant at either 5% or 1% level. The t_{13} 's for the entire group of sportspersons are significant for Factor A, Factor C, Factor D, Factor G, Factor H, Factor I, Factor O, Factor Q₃ and Factor Q₄. Hence, it may be inferred that the sportspersons, irrespective of the sex to which they belong, have scored significantly different on several psychological attributes after 12 months of training, rigorous physical activities and competitive sports participation.

However, such changes are mere prominent and more universal after 18 months of such activities when the Phase IV data collection took place. The t_{14} 's for 10 out of 14 factors are significant for the sportspersons as a whole and The sportspersons of such activity on Factor B, Factor F, Factor H and Factor J. The male sportspersons, similarly, did not score significantly different on Factor B, Factor H, Factor M and Factor Q₃ whereas the female sportspersons did not score significantly on Factor B, Factor E, Factor H, Factor J and Factor O.

Changes in Psychological Attributes on Non - Sportspersons after 18 Months

The 169 non-athletes were not subjected to any of the activities like rigorous physical activity, competitive sports participation and training by selected coaches. However, it is imperative to know whether any significant changes in the psychological attributes of these non-athletes noticed during these 18 months. As such, certain movements in the same range of different psychological scales may be expected due to developmental changes. Table 4.23 presents the t_{12} 's, t_{13} 's, and t_{14} 's for non-sportspersons as a whole, and the male

and female non-sportspersons. None of the t_{12} 's are significant for any of the factors for these three groups. However, t_{13} for male sportspersons on Factor I, Factor N and for female sportspersons on Factor A, Factor F and Factor J, and for all non-sportspersons as Factor A and Factor J are significant at 5% level. The t_{14} 's for male sportspersons on Factor C, Factor F, Factor I, Factor N, Factor O, Factor 3 and Factor Q₄, for female non-sportspersons on Factor F, Factor N and Factor Q₃, for non-sportspersons as a whole for Factor F, Factor N, Factor Q₃ and Factor Q₄ are significant at either 5% or 1% level. The non-athletes as a group have registered significant changes on 4 out of 14 factors in comparison to the sportspersons as a whole who registered such changes in 10 out of 14 factors.

TABLE 4.23
Difference Between Scores of Non-Sportspersons on
Different Factors for the Four Phases of Data Collection

| Factor | Male | | | Female | | | Total | | |
|----------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | t_{12} | t_{13} | t_{14} | t_{12} | t_{13} | t_{14} | t_{12} | t_{13} | t_{14} |
| A | 0.29 | 0.23 | 1.02 | 1.12 | 2.55* | 1.22 | 0.75 | 2.25* | 0.36 |
| B | 0.69 | 0.19 | 0.75 | 0.76 | 0.78 | 1.37 | 0.20 | 0.58 | 0.86 |
| C | 0.53 | 1.33 | 2.36* | 1.56 | 0.91 | 1.24 | 1.29 | 1.53 | 1.16 |
| D | 1.52 | 1.28 | 1.60 | 1.11 | 1.38 | 0.16 | 1.84 | 0.16 | 1.20 |
| E | 1.55 | 1.19 | 1.65 | 1.60 | 1.75 | 0.29 | 1.40 | 1.92 | 1.47 |
| F | 0.93 | 0.67 | 2.08* | 1.19 | 2.43* | 2.92** | 0.68 | 1.92 | 3.14** |
| G | 0.87 | 0.12 | 0.03 | 0.87 | 0.73 | 2.42* | 0.67 | 0.66 | 1.76 |
| H | 0.11 | 0.64 | 0.84 | 0.64 | 1.57 | 1.26 | 0.45 | 2.43 | 0.55 |
| I | 0.48 | 3.57** | 3.43** | 0.92 | 1.90 | 0.91 | 1.12 | 1.58 | 0.64 |
| J | 0.69 | 0.00 | 1.57 | 0.09 | 2.12* | 0.77 | 1.48 | 1.54 | 1.51 |
| N | 1.01 | 2.35* | 5.04** | 1.21 | 1.29 | 3.07* | 1.31 | 2.16* | 5.13* |
| O | 1.23 | 1.55 | 2.31* | 0.89 | 0.11 | 1.75 | 1.13 | 0.94 | 0.20 |
| Q ₃ | 0.80 | 0.00 | 2.20* | 0.77 | 0.75 | 2.68** | 0.68 | 0.63 | 3.42** |
| Q ₄ | 0.66 | 0.26 | 2.45* | 1.39 | 0.87 | 1.62 | 1.27 | 0.78 | 2.84* |

* significant at 5% level.

** significant at 1% level.

Significant Difference Between Initial and Final Scores of Sportspersons Playing Group Games

Table 4.24 depicts the mean stenscores, standard deviations and *t*-ratios for the players of group games for the four phases.

From Table 4.24 it is evident that there is hardly any significant difference between the mean stenscores of Phase III and Phase I pertaining to sportspersons playing group games. This group has registered significant changes with respect to factors like B, C, F, I and Q₄ after Phase III of data collection. On the other hand this group has registered more or less universally significant changes at the end of Phase IV with respect to most of the factors like F, J, N, Q₃ and Q₄.

TABLE 4.24
Means and S.d.'s of Players of Group Games for Four
Phases on All the Factors

| Factor | Phase I | | Phase II | | Phase III | | Phase IV | | <i>t</i> ₁₃ |
|----------------|---------|------|----------|------|-----------|------|----------|------|------------------------|
| | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. | |
| A | 5.03 | 1.65 | 5.08 | 1.26 | 5.03 | 1.62 | 5.62 | 1.26 | 0.01 |
| B | 4.25 | 2.42 | 3.66 | 1.42 | 3.18 | 2.14 | 4.20 | 1.29 | 4.75 ** |
| C | 6.93 | 1.54 | 6.65 | 1.23 | 6.57 | 1.83 | 5.97 | 1.30 | 2.14 * |
| D | 4.68 | 1.30 | 4.39 | 1.16 | 4.66 | 1.39 | 5.44 | 1.29 | 0.17 |
| E | 4.84 | 1.74 | 4.63 | 2.19 | 5.09 | 1.84 | 5.87 | 1.59 | 1.39 |
| F | 5.98 | 1.72 | 5.64 | 2.08 | 5.50 | 1.91 | 5.99 | 1.78 | 2.68 ** |
| G | 6.41 | 1.94 | 6.45 | 1.70 | 6.09 | 1.92 | 6.87 | 1.47 | 1.68 |
| H | 6.50 | 1.70 | 6.55 | 1.25 | 6.19 | 1.62 | 7.00 | 1.24 | 1.84 |
| I | 6.04 | 1.19 | 5.95 | 1.44 | 6.35 | 1.42 | 6.45 | 1.43 | 2.36 ** |
| J | 5.21 | 1.63 | 5.58 | 1.80 | 5.15 | 1.72 | 5.33 | 1.30 | 0.42 |
| N | 5.34 | 1.46 | 5.43 | 1.78 | 5.46 | 1.58 | 5.31 | 1.44 | 0.77 |
| O | 4.85 | 1.22 | 4.70 | 1.21 | 5.01 | 1.29 | 5.32 | 1.29 | 1.30 |
| Q ₃ | 6.09 | 1.73 | 6.10 | 1.53 | 5.82 | 1.77 | 6.24 | 1.41 | 1.57 |
| Q ₄ | 4.45 | 1.48 | 4.52 | 1.56 | 4.73 | 1.40 | 4.65 | 1.29 | 1.96 * |

* Significant at 0.05.

** Significant at 0.01.

Significant Difference Between the Initial and Final Scores of Players of Individual Games

Table 4.25 represents the *t*-ratios between the mean stenscores for Phase I on one hand and for Phase III and Phase IV on the other pertaining to sportspersons playing individual games. From this table it is evident that this group did not register significant changes at the end of Phase III with respect to most of the factors except factors like B and D. At the end of Phase III this group registered significant changes with respect to factors like B and D. However, this group registered significant changes with respect to factors like A, D, E and Q₄ at the end of Phase IV.

TABLE 4.25
Means & S.d.'s of Players of Individual Game
on All Factors in The Four Phases

| Factor | Phase I | | Phase II | | Phase III | | Phase IV | | <i>t</i> ₁₃ | <i>t</i> ₁₄ |
|----------------|---------|------|----------|------|-----------|------|----------|------|------------------------|------------------------|
| | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. | | |
| A | 5.28 | 1.21 | 5.03 | 1.51 | 5.29 | 1.61 | 5.85 | 1.32 | 0.09 | 4.58 * |
| B | 5.80 | 1.67 | 4.07 | 1.44 | 5.00 | 2.06 | 5.34 | 0.72 | 3.23 ** | 1.85 |
| C | 7.38 | 1.24 | 6.69 | 1.08 | 7.18 | 1.56 | 7.45 | 1.23 | 1.40 | 0.56 |
| D | 4.58 | 1.26 | 4.15 | 1.29 | 4.20 | 1.44 | 5.00 | 1.23 | 2.83 * | 3.43 ** |
| E | 4.91 | 1.47 | 4.43 | 1.70 | 4.92 | 1.69 | 5.30 | 1.39 | 0.08 | 3.04 ** |
| F | 5.98 | 1.49 | 5.96 | 1.66 | 5.81 | 1.96 | 5.76 | 1.57 | 0.97 | 1.45 |
| G | 6.92 | 1.82 | 6.97 | 1.58 | 6.58 | 1.72 | 6.81 | 1.30 | 1.94 | 0.68 |
| H | 7.33 | 1.38 | 6.46 | 1.37 | 7.07 | 1.81 | 7.24 | 1.19 | 1.63 | 0.69 |
| I | 5.96 | 1.45 | 5.66 | 1.33 | 6.04 | 1.36 | 6.10 | 1.39 | 0.55 | 0.98 |
| J | 5.18 | 1.52 | 5.46 | 1.38 | 4.95 | 1.72 | 5.25 | 1.39 | 1.47 | 0.46 |
| N | 5.24 | 1.38 | 5.51 | 1.49 | 5.28 | 1.47 | 5.04 | 1.15 | 0.28 | 1.58 |
| O | 4.43 | 1.25 | 4.64 | 1.18 | 4.57 | 1.49 | 4.35 | 1.03 | 0.96 | 0.70 |
| Q ₃ | 6.59 | 1.49 | 6.68 | 1.19 | 6.50 | 1.71 | 6.52 | 1.17 | 0.55 | 0.52 |
| Q ₄ | 4.09 | 1.35 | 4.22 | 1.46 | 4.04 | 1.50 | 4.53 | 1.22 | 0.37 | 3.39 ** |

* Significance at 0.05 level.

** Significance at 0.01 level.

Change In Level of Performance of Sportspersons During the Period Under Study

Table 4.26 presents the mean performance scores alongwith standard deviations for sportspersons as a group and sportspersons belonging to different groups for the three phases.

The second phase of the data collection took place after a gap of one year from Phase I and the third phase of data collection was after six months from phase II. Hence, there was gap of one year from Phase I and the third phase of data collection was after six months from Phase II. Hence, there was a gap of eighteen months between the initial and final phases of data collection. Column t_{12} of Table 4.26 presents the t -ratios for the difference between the mean performance scores of Phase I and Phase II whereas column t_{13} represents the t -ratios for the difference between the performance scores of Phase I and Phase III.

TABLE 4.26
Means & S.d's of Performance Scores of Sportspersons

| S.N. | Group | Phase I | | Phase II | | Phase III | | t_{13} | t_{14} |
|------|--------------------|---------|------|----------|------|-----------|------|----------|----------|
| | | Mean | S.D. | Mean | S.D. | Mean | S.D. | | |
| 1. | AT (30) | 1.20 | 1.06 | 1.90 | 1.81 | 4.33 | 2.10 | 1.54 | 6.54 ** |
| 2. | BB (90) | 1.11 | 1.65 | 3.63 | 2.12 | 5.32 | 1.75 | 3.07 * | 6.26 ** |
| 3. | BD (12) | 3.42 | 2.48 | 4.50 | 2.72 | 5.75 | 1.01 | 0.78 | 2.22 * |
| 4. | FB (14) | 1.14 | 1.02 | 3.36 | 2.61 | 5.56 | 1.50 | 3.03 ** | 5.50 ** |
| 5. | GK (12) | 4.67 | 1.25 | 4.78 | 1.23 | 4.67 | 0.94 | 1.06 | 0.00 |
| 6. | HC (40) | 2.47 | 1.60 | 2.65 | 1.87 | 4.70 | 1.89 | 2.15 * | 7.54 ** |
| 7. | MA (27) | 4.22 | 2.34 | 4.70 | 2.91 | 5.89 | 2.24 | 1.08 | 2.82 ** |
| 8. | VB (25) | 2.28 | 1.90 | 3.28 | 2.31 | 4.08 | 2.88 | 2.79 ** | 4.69 ** |
| 9. | ALL | 2.42 | 1.85 | 3.32 | 2.03 | 4.93 | 2.03 | 4.63 ** | 12.12 ** |
| 10. | Group Games (76) | 2.79 | 1.99 | 4.28 | 1.57 | 6.50 | 1.89 | 2.72 ** | 3.19 ** |
| 11. | Indiv. Games (103) | 2.15 | 1.81 | 2.62 | 1.73 | 3.77 | 1.75 | 2.60 * | 2.64 * |
| 12. | Males (104) | 1.44 | 2.71 | 2.64 | 2.90 | 6.64 | 2.17 | 3.70 ** | 3.00 ** |
| 13. | Females (75) | 3.77 | 2.46 | 4.27 | 2.35 | 5.32 | 1.74 | 1.97 * | 2.83 ** |

* Significant at 0.05 level.

** Significant at 0.01 level.

From Table 4.26 it can be seen that sportspersons as a group registered significant changes in the performance scores after a gap of twelve months from the initial period of data collection. The mean performance score for all sportspersons increased to 3.32 in Phase II from 2.42 in Phase I, the t -ratio for the difference between the two is 4.63 which is significant at 1% level. The sportspersons belonging to the football, volleyball, basket ball and hockey groups registered significant positive changes at the end of twelve months period. The t -ratios for differences between mean performance score of Phase I and Phase II for the football, volleyball, basket ball and hockey groups are 3.03, 2.79, 3.07 and 2.15 respectively. The first two t -ratios are significant at 5% level whereas the remaining two are significant at 1% level.

The sportspersons as a group registered significant positive changes in the performance scores over the eighteen month period. The mean performance score in this group increased to 4.93 at the end of Phase III against 2.42 in Phase I. The t -ratio for the difference between these means is 12.12 which is significant at 1% level. Sportspersons are playing different games significant to positive changes in the performance time over the period under study. The t_{13} 's for the athletics, football, volleyball, martial arts, basket ball and hockey groups are significant at 1% level whereas the t -ratio for the badminton group is significant at 5% level.

Sources of Variance In Behavioural Measures of Different Psychological Variables in Sports-Specific Situation

It has already been discussed in chapter three that the children's California Q-Set (CCQ) test as developed by Block and Block (1978) was modified by the present investigator to generate sports-specific situations. It has also been discussed that the hundred question items of the CCQ test can be constituted as hundred sports-specific situations. However, these items do not refer to one particular psychological variables which may be the fourteen factors under the CPQ. The present investigator had already sorted the sports-specific situation items against different factors in Chapter three. The CCQ was administered to 175 sportspersons. Each item has only one mode of response, that is one of the numerical point from the nine categories already explained in Chapter three. The number of situations for the psychological variables are given in Table 4.27

TABLE 4.27
Distribution of Situational Items among Factors

| <i>S.No.</i> | <i>Name of factor</i> | <i>No. of Situational items</i> |
|--------------|-----------------------|-------------------------------------|
| 1. | Factor A | 17 |
| 2. | Factor B | 1 |
| 3. | Factor C | 8 |
| 4. | Factor D | 5 |
| 5. | Factor E | 17 |
| 6. | Factor F | 7 |
| 7. | Factor G | 9 |
| 8. | Factor H | 3 |
| 9. | Factor I | 10 |
| 10. | Factor J | 8 |
| 11. | Factor N | 9 |
| 12. | Factor O | 4 |
| 13. | Factor Q ₃ | 3 |
| 14. | Factor Q ₄ | 9 |

As Factor B has only one situational item, this factor was not subjected to the variance-components analysis. Before carrying out the variance component approach as described in Chapter three-two-way ANOVA was carried out to find out the mean sum squares of persons, situations and person \times situation interaction. The factor scores of sportspersons in sports Specific Situations is given in Table 4.28

Sources of Variance In Behavioural Measures of Different Psychological Attributes of Modified CCQ

Table 4.29, presents the degrees of freedom and mean squares from two-way ANOVA of the responses to seventeen situations by the 175 subjects (sportspersons). In Table 4.29, the mean squares of situations are smaller than the mean squares of persons.

From Table 4.29 it is evident that the F -ratios for the persons, situations and person \times situation interaction are significant at 0.01 level implying that these sources of variance are significant contributors to behavioural variance. In other words, persons, situations and their interactions account significant portions of the variances in sociability scores.

However, our other main concern is to know the exact degree of contribution of the three sources—persons, situations and person-situation interactions to the total variances of behavioural responses with respect to 13 factors of modified CCQ. We have discussed the detailed procedure regarding the variance component analysis to find out the variances (in absolute terms) due to persons, situations and person-situation interaction with respect to any reported behavioural variance. We reproduce the variance component equation here.

$$\begin{aligned}E_{(MSP)} &= Z^2 + MX^2 + I^2 \\E_{(MST)} &= Z^2 + MY^2 + I^2 \\E_{(MSPT)} &= Z^2 + I^2 \\E_{(MSR)} &= Z^2\end{aligned}$$

where 'p' stands for persons
't' stands for situations
'pt' stands for person - situation interaction
'r' stands for residual
'm' stands for (degrees of freedom for situations + 1)
'n' stands for (degrees of freedom for persons + 1)
'X²' stands for variance due to persons
'Y²' stands for variance due to situations
'Z²' stands for variance due to residual
'I²' stands for variance due to person - situation interaction.

Table 4.29 presents the analysis of variance of reported responses to situation in the modified CCQ on Factor A. This table provides us the mean squares corresponding the variations due to persons, situations, person-situation interaction and residual.

By substituting these calculated values of mean squares for the expected values, the variant component analysis equation becomes:

$$\begin{aligned}163.14 &= Z^2 + 17 X^2 + I^2 \\64.46 &= Z^2 + 8 Y^2 + I^2\end{aligned}$$

$$23.36 = Z^2 + I^2$$

$$5.05 = Z^2$$

Solving the 4 equations for the 4 variables Z^2 , X^2 , Y^2 , I^2 we get $X^2 = 2.87$, $Y^2 = 2.27$

$$I^2 = 4.28, Z^2 = 2.24$$

TABLE 4.29
Analysis of Variance of Reported Responses to Situations
in the Modified CCQ on Factor A

| Sources of Variation | Sum of Squares | d.f. | Mean Squares | F-ratio |
|--|----------------|---------|--------------|---------|
| Between persons | 1142.83 | 7.00 | 163.14 | 32.30 |
| Between situations | 1031.11 | 16.00 | 64.46 | 12.76 |
| Persons \times Situation interaction | 2615.92 | 112.00 | 23.36 | 4.62 |
| Residual | 14347.99 | 2839.00 | 5.05 | |
| Total sum of squares | 19137.85 | 2974.00 | | |

and total variance comes to 11.66 for behaviour responses connected with Factor A. Calculating the percentage contribution of each source to total behavioural variance, we find variances due to persons, situations, person - situations, interactions and residual factors contribute 19.46%, 19.21%, 36.70% and 19.21% to the total variances to behavioural responses with respect to Factor A.

Similarly, from the sum of squares, mean sum squares, and degree of freedom for each factor, the F -ratios between the sources of variation like persons, situations and person-situation interaction and the total variance are depicted in Table 4.30. From Table 4.30, it is evident that both persons and situations contribute significantly to the total variances with respect to the responses with respect to the 13 factors of modified CCQ. What is more important is the F -ratio between variance due to person-situation interaction and total variance is also significant at either 5% or 1% level. This implies that the person-situation interaction is one of the important contributor to the total behaviour variance as reported with respect to 13 factor as modified CCQ taking consideration of different situations.

TABLE 4.30
Results of ANOVA of a Reported Responses to Situations
in the Modified CCQ on All Factors

| Factor | F - Ratio Between Sources of Variations | | |
|----------------|---|-------|------|
| | I | II | III |
| A | 32.30 | 12.76 | 4.42 |
| C | 7.74 | 9.37 | 4.23 |
| D | 7.22 | 7.60 | 2.95 |
| E | 4.35 | 6.38 | 6.39 |
| F | 6.91 | 6.41 | 2.16 |
| G | 11.06 | 6.50 | 3.44 |
| H | 6.38 | 9.78 | 3.01 |
| I | 7.61 | 7.57 | 2.03 |
| J | 11.80 | 9.73 | 7.50 |
| M | 7.69 | 5.59 | 2.99 |
| O | 6.10 | 9.17 | 2.71 |
| Q ₃ | 6.85 | 9.27 | 2.85 |
| Q ₄ | 11.16 | 6.55 | 2.86 |

TABLE 4.31
Contribution of Person, Situation, and Person-Situation Interaction
to total Variation with Respect to Different Psychological
Variables situation

| Factor | Sources of Variation | | | | |
|--------|----------------------|-----------------|--------------------------------|-----------------|----------------|
| | Person | Situations | Person × Situation Interaction | Residual | Total |
| A | 2.87 (19.46) | 2.27 (19.21) | 4.28 (36.70) | 2.24 (19.21) | 11.66 (100) |
| C | 1.57 (14.87) | 1.93 (18.28) | 4.54 (42.99) | 2.52 (23.87) | 10.56 (100) |
| D | 2.88 (24.31) | 2.28 (19.24) | 3.90 (32.91) | 2.79 (23.54) | 11.85 (100) |
| E | 1.43 (15.41) | 1.60 (17.24) | 3.73 (40.19) | 2.52 (27.16) | 9.28 (100) |
| F | 2.35 (23.76) | 2.06 (20.83) | 2.84 (28.72) | 2.64 (26.69) | 9.89 (100) |
| G | 1.43 (15.41) | 1.60 (17.24) | 3.73 (40.19) | 2.52 (27.16) | 9.28 (100) |
| H | 3.75 (27.63) | 2.84 (20.93) | 4.09 (30.14) | 2.89 (21.30) | 13.57 (100) |
| I | 2.68 (23.13) | 1.59 (17.69) | 2.68 (29.81) | 2.64 (29.37) | 8.99 (100) |

(Contd.)

TABLE 4.31 (Contd.)

| Factor | Sources of Variation | | | | |
|----------------|----------------------|-----------------|---------------------------------------|-----------------|----------------|
| | Person | Situations | Person \times Situation Interaction | Residual | Total |
| J | 2.34 (21.47) | 1.98 (18.16) | 4.29 (39.36) | 2.29 (29.01) | 10.90 (100) |
| N | 1.96 (20.23) | 1.51 (16.08) | 3.50 (37.27) | 2.48 (26.41) | 9.39 (100) |
| O | 2.97 (24.57) | 2.68 (22.16) | 3.65 (30.19) | 2.79 (23.08) | 12.09 (100) |
| Q ₃ | 4.08 (25.42) | 5.17 (32.33) | 3.92 (24.42) | 2.88 (17.93) | 16.05 (100) |
| Q ₄ | 2.64 (24.76) | 1.88 (17.69) | 3.55 (33.05) | 2.59 (24.03) | 10.66 (100) |

From Table 4.31 it is evident that the contribution of persons to total variance in the psychological scores on different factors varies between 14.87% to maximum 25.42%. The average contribution of persons to the total variance in different psychological variables is 21.57%. On the other hand, situations did contribute, 19.77% on average to the total variance of psychological variables. The person \times situation interaction contributed 34.32% to the total variance in the psychological variables. Hence, it may be concluded that persons-situation interaction is not only equally important as the person or situational factors are but also it contributes more than either person or situation factors.

Conclusion

In this chapter the results of the present study were discussed in detail with the help of *t*-ratios and variance component analysis. The difference between the subjects belonging to different groups on the fourteen psychological factors were discussed in the first part. Secondly, the significant differences between initial and final scores of both sportspersons and non - sportspersons on the fourteen factors were discussed. Thirdly, the significant differences between initial and final performance scores were discussed threadbare. Lastly, the results regarding the sources of behavioural variance with regard to thirteen psychological variables in sports context alongwith the relative contributions of persons, situations and person \times situation interaction were also discussed.

Discussion

The present study is a follow-up one which deals with the changes in the psychological attributes of different group of individuals, both sportspersons and non-sportspersons. However, before analysing the changes with respect to psychological variables it is imperative to study the difference between the sportspersons and non-sportspersons, group and individual game types, at a point of time. Keeping the criticism of the trait perspective in view the stability of the CPQ measures is attempted. With an objective to find out relative contributions of persons, situations, and person-situation interaction to total variance with respect to a particular psychological attribute, the variance was partitioned into different components.

In Chapter IV results of present study were presented and analysed in an extensive manner. It will be appropriate to aggregate the summary of the results with respect to broad categories keeping in view the hypotheses of the present study.

Difference in Psychological Attributes of Sportspersons

The results of the present study does support the first hypothesis of study which stated that there would be no significant difference between the sportspersons and non-sportspersons on the fourteen psychological factors of CPQ. However, this support is not universal across all psychological variables. The difference between the sportspersons and non-sportspersons with regard to factors like phlegmatic-excitability (Factor D), desurgency-surgency (Factor F) and thrextia-parmia (Factor H), was significant. On the other hand, the difference between sportspersons and non-sportspersons with regard to the remaining factors of CPQ namely, sociability, intelli-

gence, emotional stability, submissive-dominance, super-ego strength, harria-premsia, zeppia-coasthenia, naivete-shrewdness, untroubled adequacy-guilt proneness, self-sentiment and ergic tension were not significant. The results of the present study show that the juvenile sportspersons differed from juvenile non-sportspersons with regard to the Factor D in the sense that the non-sportspersons were inactive, complacent, self-effacing than the sportspersons. Both the sportspersons and non-sportspersons were found to be enthusiastic and happy-go-lucky types whereas the non-sportspersons scoring higher than sportspersons. However, with regard to Factor H the present study showed that both young sportspersons and non-sportspersons were adventurous, thick-skinned and society bold. The juvenile sportspersons were more adventurous and bold as compared to the non-sportspersons. As it has been already pointed out, there was no significant difference between the juvenile, sportspersons and non-sportspersons with regard to other psychological variables of CPQ.

The results of the present study does not provide unequivocal support to the personality profile of sportspersons as purported by Cooper (1969) and Alderman (1974). However, the results of the present study may be easily explained by the modification and attrition model of Kroll (1970), according to which at the entrance level sportspersons exhibit greater amount of heterogeneity. As the present sample of sportspersons and non-sportspersons belong to the age group of 10 to 13 years, they are yet to develop their full personality profile, thereby resulting in not so discriminating psychological characteristics manifest by these two groups.

Sex Difference in Psychological characteristics of Sportspersons and Non-Sportspersons

The juvenile sportspersons and non-sportspersons were categorized on the basis of their sex and *t*-ratios were obtained between the scores on different psychological variables of both males and females.

The male and female sportspersons scored significantly different with respect to most of the psychological factors except Factor C and Factor H and Factor Q₄. The *t* - ratios between the male and female scores were significant at 1% level. The male sportspersons were extroverts as compared to female sportspersons who were

introverts. The difference between the scores on the intelligence factor was much pronounced, the males scoring 6.25 and females scoring 3.30.

On the average the male sportspersons as well as the female sportspersons were of phlegmatic temperament. However, the males were less inactive, deliberate, stodgy and undemonstrative as compared to the female sportspersons. On the submissiveness - dominance scale the male sportspersons were found to be dominant with mean stenscore of 4.28 whereas the females were submissive with a mean stenscore of 5.67. On the other hand, the male sportspersons were found to be sober, taciturn and serious with a mean stenscore of 4.44 on Factor F whereas the female sportspersons were found happy-go-lucky, heedless and talkative with a mean stenscore of 7.49. Both the male and female sportspersons had super-ego strength and character with the males scoring higher than the females on Factor G. Both the female and male sportspersons were found to be neither tough-minded nor tender-minded. However, the males were tending to be sensitive, dependent and over-protected than the females. The females scored 4.90 on the Zeppia and Coasthenia scale from which they may be characterized as jestful and liking group action whereas the males with a score of 5.43 may be described as neither jestful nor circumspect. On the naivete-shrewdness scale both the male and female sportspersons scored around 5.00 on the average from which it may be inferred that they were neither naive nor shrewd. However, the females scored more than the median value thereby tending themselves towards shrewdness. From Table 4.3 it may be inferred that the male and female sportspersons were characterized by self-assurance, complacency and secure with the males tending towards the zone of being neither self-assured and secure, nor apprehensive and insecure. Both the male and female sportspersons were found having high strength of self-sentiment with males having significantly higher scores than the females on Factor Q₃.

As it has already pointed out there were no significant differences between the male and female young sportspersons in characteristics like ergic tension (Factor Q₄), emotional stability (Factor C) and threitia-parmia (Factor H). Both these groups were found to be emotionally stable, adventurous, society bold, relaxed and

unfrustrated. It was hypothesised that there will be no significant difference in psychological characteristics of male and female juvenile sportpersons. However, the present study has satisfied this hypothesis with respect to 11 out of 14 factors of CPQ. Similar kind of findings have been earlier reported by Williams and Parkin (1980), Corbin and Cox (1979) and Cratty (1989), Rushell (1967) and Uppal and Gill (1986). The reasons for such differentiation in characteristics on basis of sex are due to different kinds of situational and social factors encountered by the subjects. (Kennick, 1972 and Corbin and Nix 1979).

Like the male and female sportpersons, the male and female non-sportpersons were significantly different with respect of different psychological characteristics except those on Factor C, Factor D, Factor G, Factor H and Factor O. Hence, it may be concluded that male and female sportpersons differ from each other on fewer characteristics than the sportpersons. The non-sportpersons belonging to both sexes were found to be emotionally stable, undemonstrative and inactive, adventurous and society bold, neither zestful nor circumspect, and self assessed and secured. On the other hand, male non-sportpersons were found to be more warm-hearted and outgoing, intelligent, obedient, sober and taciturn, emotionally disciplined and responsible, tender-minded and sensitive, forthright and unpretentious, controlled and exacting with power and relaxed and unfrustrated than the female non-sportpersons. From this it may be inferred that the hypothesis that there was no significant difference between male and female non-sportpersons was satisfied with respect to the above mentioned factors.

Inter-Sport Comparison of Sportpersons

It was hypothesised that sportpersons belonging to subgroups like football, athletics, badminton etc. would not have significantly different psychological characteristics than the sportpersons as a whole. It was also hypothesised that there would be no significant difference in the psychological characteristics of sportpersons playing individual and team games. To test the former hypothesis the *t* - ratios between the subgroup means and the population mean (the entire group of sportpersons) were obtained. In order

to find differences between the psychological characteristics of sportspersons playing team and individual games, *t*-ratios were also computed.

The athletics group was found to be significantly different from the rest of the sportspersons with respect to psychological characteristics like extraversion and ergic tension. This group was found to be warm hearted, outgoing, participating as compared to sportspersons as a group which was reserved, detached and aloof. This group did not exhibit significantly different characteristics on rest of the psychological factors.

The footballers were significantly different from the rest of the sportspersons in characteristics like intelligence and surgency. Though the group average on the intelligence factor was 5.00, the footballers score 6.5 on the average implying this group being more intelligent than the sportspersons as a group. Though the sportspersons as a group were enthusiastic, happy-go-lucky and cheerful, the footballers were sober, taciturn and serious. The footballers did not have significantly different characteristics on the rest of the psychological factors of CPQ.

The volleyball group did not exhibit significantly different characteristics than the sportspersons as a whole except on Factor J. This group found to be circumsuspect, individualistic and reflective in contrast to the sportspersons as a group which was found to be neither gregarious and vigorous nor circumsuspect and reflective.

The badminton group demonstrated significantly different characteristics than the sportspersons as a whole on factors like A, B, E and F. Though the sportspersons as a group tended to be neither introvert nor extrovert, the badminton players were extroverts. This group found to be more obedient and docile than the entire group of sportspersons. On the other hand, though the sportspersons were enthusiastic and happy-go-lucky, the badminton players were found to be neither sober nor enthusiastic. The badminton group was found to be more intelligent than the rest of the sportspersons.

The martial arts group exhibited significantly different characteristics than the sportspersons as a whole on factors like intelligence, desurgency-surgency, super-ego strength, threctia-parmia, toughmindedness and ergic tension. They were found to be more intelligent, enthusiastic and happy-go-lucky, of having super-ego

strength, adventurous and society bold, tough-minded, and relaxed and composed than the sportspersons as whole.

The basketball players did not demonstrate significantly different characteristics with regard to most of the psychological factors than the sportspersons as a whole except on Factor N. This group was found to be more often naive, as compared to the sportspersons as a whole who were found to be shrewed.

The hockey players exhibited significantly different characteristics than the sportspersons as a whole on factors like B, G, H and Q₃. They were found to be less intelligent, of having less ergic ego strength, less adventurous and social bold and less controlled and compulsive than the sportspersons as a group.

From the above discussion it is evident that the hypothesis that there would be no significant intersport group differences in psychological characteristics was not supported universally. Similarly, the hypothesis that sportspersons playing team games and individual games would not have significantly different psychological characteristics was also not supported unequivocally. This hypothesis was rejected in case of Factor B and it was found that significant differences did exist with respect to intelligence of sportspersons playing individual and team games. However, there was no significant difference between the sportspersons playing team and individual groups with respect to factors like emotional stability, dominance, surgency, super-ego strength, shyness - society bold, inadequacy and strength of self-sentiments, sociability, excitability, toughmindedness, zeppia-coasthenia, shrewdness and ergic-tension.

The above findings regarding significant difference between team and individual games is supported by studies by Malumphy (1968), Ogilvie (1968), Weber and Pronsedale (1967), Kirkcaldy (1982), Shukla (1986), Singh (1986). Cratty (1989) has summarised such finding by different studies and stated that individual sport athletes as a group are likely to be less independent, less anxious and emotional and more introverted than team-sport athletes.

Such unequivocal findings are constantly reported in research studies in sports psychology. As Cratty (1989) points out, comparisons of one athlete group with another have demonstrated the markedly inconsistent findings from such research studies. However, such inconsistencies well reconciled by the attrition and modification model by Kroll (1970). According to this model no

common characteristics existed initially but through modification (learning) and attrition athletes with adaptable or suitable characteristics persist in the sport. Thus novice players appear to be dissimilar, whereas veteran players would be similar. Similarly, the common characteristics of elite athletes in one sport may differ from those of elite athletes of another sport challenged by a different set of circumstances (Silva, 1984). The present study covers the novice players who are at the entrance level. Hence, not so similar characteristics of the different groups of sportpersons are not so surprising.

Changes in Scores on Psychological Factors of Sportpersons over the Period Under Study

The hypothesis that competitive sports environment will lead to positive changes in the psychological characteristics of sports persons was proved by the global findings of the study. The sportpersons as a group demonstrated significant changes in ten psychological attributes out of fourteen associated with CPQ. Sportpersons did not exhibit any significant change in characteristics like intelligence, desurgency-surgency, thretia-parmia, and zeppia-coasthenia. The insignificant changes in the intelligence factor is quite understandable as intelligence is basically an innate psychological faculty which is not subject to changes due to influence of environmental factors. The insignificant changes with regard to the remaining three factors may be discussed against the initial mean stenscore on these factors. The sportpersons as a group score 5.77 on Factor A in the beginning of the period under study. This score is already high on the surgency scale indicating the group being enthusiastic and happy-go-lucky. Insignificant changes at the end of the period shows that the group remained enthusiastic and happy-go-lucky. Similarly, the initial scores on Factor H and Factor J did indicate that sportpersons were already adventurous and society bold, individualistic and reflective. According to the attrition and modification model and selection model of sports participation and personality changes, these sportpersons might have the desired characteristics as demanded by sports situations, thereby not necessitating any change.

The sportpersons exhibited positive changes on Factor A. At the beginning of the period the group was neither introvert nor

extrovert but at the end of the period the group has become extrovert with a mean stenscore of 5.75. This group became more emotionally stable during the period under study. From a group of inactive and undemonstrative sportspersons this group became moderately overactive and excitable. On the dominance scale this group improved its position from neither submissive nor dominant to moderately dominant. The sportspersons as a group had a higher super-ego strength in the beginning of the period under study. It demonstrated significant negative change during this period to become a group of moderately high super-ego strength. As a result of sport competitive environment the group became more tough-minded than what it was in the beginning of the period whereas at the end of it, the group became significantly more shrewd.

On the adequacy-guilt-proneness scale the group moved from self-assured, complacent to apprehensive, boring, and insecure. They moved from a group of low ergic tension to a group of neither low nor high ergic tension.

In contrast to sportspersons, the non-sportspersons did not exhibit significant changes with respect to many factors on CPQ except Factor N, Factor Q₃ and Factor Q₄. As regards to these factors both the sportspersons and non-sportspersons exhibited significant positive changes. However, the sportspersons demonstrated significant changes in seven other factors of CPQ. The juvenile sportspersons were selected boys and girls under the Sports Authority of India scheme and were kept in Sports Hostels. This group was subject to intensive training and participation in competitive sports. On the other hand, the non-sportspersons were ordinary high school boys and girls with no consistent sports activities.

Mayer et al (1988) suggested that significant changes on different psychological attributes of CPQ might be due to developmental changes. The effect of developmental changes on young personalities may not be discounted outrightly. However, as the number of factors on which sportspersons demonstrated significant changes were much larger than the number of factors on which non-sportspersons exhibited significant changes. The findings of the study are supported by similar findings by Tattersfield (1971) who reported the sportspersons moved upward in attributes like extroversion, emotional stability and dependency. The findings of the present study are also similar to those found by Buccola and Stone (1975), Doyme et al (1987) and Nelson et al (1991).

Changes in Scores on Psychological Factors of Males and Females Over the Period Under Study

It has already been pointed out in the previous section that sportspersons as a group demonstrated significant changes in psychological attributes of CPQ. The male sportspersons exhibited significant changes on factors like sociability, emotional stability, excitability, dominance, enthusiasm, super-ego strength, tough-mindedness, coasthenia, guilt proneness, and ergic tension. On the other hand, the female sportspersons demonstrated significant changes on psychological scales like sociability, emotional stability, excitability, surgency, super-ego strength, shrewdness, strength of self-sentiment and ergic tension. It may be seen that the female sportspersons did not exhibit significant changes with respect to dominance, toughmindedness and guilt proneness in case of which the male sportspersons exhibited significant changes. The different levels and changes in the psychological attributes of males and females sportspersons is supported by findings of Khan (1988).

In contrast to the sportspersons the male and female non-sportspersons did not exhibit significant changes with respect to most of the psychological factors of CPQ. Moreover, the divergence in the few significant changes reported by male and female sportspersons is minimum as compared to the wide difference between male and female sportspersons. The male non-sportspersons scored significantly different on factors like emotional stability, surgency, tender mindedness and dependency, shrewdness, guilt proneness, strength of self-sentiment and ergic tension. On the other hand, the female non-sportspersons exhibited significant changes on attributes, like surgency, super-ego strength, shrewdness, strength of self-sentiment and ergic tension.

Changes in Scores on Psychological Factors of Sportspersons Playing Team and Individual Games over the Period Under Study

It was hypothesised that the players of individual games would register significant changes on the psychological attributes of CPQ. However, the findings of the present study do not provide unequivocal support to this hypothesis. Like the entire group of sportspersons, the players of individual games did exhibit signifi-

cant changes on several of the psychological attributes. This group showed positive changes on attributes like sociability, excitability, dominance and ergic tension. The group moved from a position of neither extrovert nor introvert to moderately introversion. This group improved its position on the phlegmatic-excitability scale from inactive and undemonstrative to neither phlegmatic nor excitable. The players of individual games moved from a position of submissiveness to dominance during the period under study. Though this group had positive changes on the ergic tension scale it still remained on the low side despite the improvement.

In contrast to the players of individual games, the players of group (team) games demonstrated significant changes in eight out of fourteen factors of CPQ. Attributes like sociability, excitability and dominance, were the common attributes where players of both the individual and group games showed significant changes in the same direction. In addition, the players of group games improved their position on attributes like super-ego strength, threctia-parmia and dependency and guilt proneness. This group improved its position from super-ego strength to moderately high super-ego strength. Similarly, this group became more adventurous and society bold during the period under study. However, significant positive changes reported by this group on Factor I indicated that this group became more dependant. On the other hand, this group moved from a position of self-assured and complacent to moderately insecure and apprehensive.

From the findings of the present study, it may be inferred that more significant changes would be observed in team game players than the individual game players. This may point out to the influence of close personal interaction and high demands of team games on personality changes of sportspersons. Oxendine (1970) had reported that players of individual games are likely to remain more subject to anxiety experience than the team game players. Findings of Khan (1988) are also supportive of the above view.

Changes in Scores on Psychological Factors of Players of Different Games

Though there was global significant changes in the psychological attributes of sportspersons with respect to most of the factors of CPQ, there was divergent trends with respect to changes attributed

to different sport groups. It is found that certain groups exhibited significant changes on more number of attributes than the other groups. Moreover, as it has been pointed out in the previous section situational demands of team and individual games might have led to different kinds of changes in the psychological attributes of players belonging to these two groups. Hence it is pertinent to delineate the changes in psychological attributes of each group separately and comparing and contrasting each group against the other thereafter.

The athletics group showed significant positive changes in case of attributes like sociability, emotional stability, exceptability, dominance, dependancy, shrewdness, guilt proneness, high strength of self-sentiment and ergic tension. On the other hand, the footballers showed significant changes on factors like emotional stability, excitability, dominance, shrewdness, and guilt-proneness.

The volleyball group became more sociable and warm-hearted during the period under report. This group moved from a position of emotional stability to more emotional stability, phlegmatic to moderately excitable, from more submissive to less submissive, from neither naive nor shrewd to moderately shrewd and from apprehensive and insecure to moderately apprehensive and insecure.

The badminton and the martial arts groups exhibited similar changes in psychological attributes like sociability, emotional stability, excitability, dependency, shrewdness, guilt proneness, strength of self-sentiment and ergic tension. The basketball group demonstrated significant changes in fewer number of factors. This group was found to be more sociable, more emotionally stable, less phlegmatic and more dependant during the period under report.

The hockey players did show significant changes on factors like sociability, emotional stability, phlegmatic, super-ego strength, therctia-parmia, dependency, shrewdness, and high strength of self-sentiment. On the other hand, the gymnastic group demonstrated significant changes in attributes like emotional stability, excitability, dominance, shrewdness, guilt proneness and high strength of self-sentiment.

As it has been pointed out earlier, almost all sportsgroups had demonstrated positive changes on the sociability score. Similar findings were earlier reported by Ikegami (1970), Yanada and Hirata (1970), Tattersfield (1975) and Buccola and Stone (1973). The findings of the present study that the footballers demonstrated significant

changes on the dominance scale are also supported by findings by Mugno et al (1985). The findings by Jasnoksi and Holmes (1981) that sportspersons became more society bold is supported by the findings of the present study with respect to hockey players.

Changes in the Level of Performance of Sportspersons, Male and Female Sportsperson, Team Game and Individual Game Players

One important objective of the present follow-up study of sportspersons was to find out the significant changes in the level of performance that occurred during the period under study. As Table 4.26 shows there was global improvement in the sports performance of the juvenile sportspersons. Significant positive changes were reported by all groups except the gymnastic group. The further break-up of sportspersons to males and females and team game players and individual game players did lend further support to the hypothesis that sports training and competitive participation did enhance the level of performance of sportspersons. As it is evident, that *t*-ratios between the performance level scores between Phase I and Phase III, and Phase I and phase III are significant at 1% level.

Relative Contributions of Persons, Situations and Person-situation interaction to the Total Variance of Behavioural Measures of Psychological Attributes

As it has been discussed in Chapter III, the variance component approach developed by Hunt and Endler (1962) provides estimates of components of variance of psychological measures. By partitioning the total variance among sources like persons, situations and person x situations interaction, the present study has found that the persons contributed 21.57% on the average to the variance of different measures of psychological variables (Table 4.31). On the other hand, situations contributed 19.77% of the variance whereas the person-situation interaction contributed 34.32%.

The findings support the hypothesis that the person, situation interaction is responsible for larger amount variance of behaviour than the contribution of persons factors or situational factors independently and jointly. This provides empirical support to the interactionists theory of sports personology. Moreover, the import-

ance of situational factors has been highlighted by the fact that nearly 34.32% of variance is explained by these factors against 21.51% by person differences.

The findings of the present study are similar to the findings of studies by Raush, Pittman and Tayler (1959), Endler and Hunt (1966, 1969), Nelson, Grindler and Mutterert (1969), Berkawitz and Green (1967), Fieder (1971), Magnusson, Grezen and Nyman (1968), Moss (1968) and Bishop and Witt (1970). The variables studied included social interaction, anxiety, honesty, hospitality, leadership, group behaviour and leisure time, choice behaviour and initiative by these authors whereas the present study encompassed 13 factors of CPQ. Moreover, the findings of the present study are consistent with the findings of the studies mentioned above in terms of percentage contribution by different sources to total variance.

Conclusion

The present study proposed, at the first place, to analyze the changes in psychological attributes and the levels of performances of sportspersons due to competitive sports environment. At advanced level, a true person situation interaction model was tested by constructing the modified CQ - Set test incorporating sports specific situations and then estimating the variance due to person factors, situational factors and person \times situation interactions.

Need of the Study

The need of the present study may be examined from

- (a) theoretical advancement in sports psychology; and
- (b) the implications in respect of practical applicability.

It has been often observed that many of the top level competitors, individuals or teams do possess more or less same capabilities in respect of their physical prowess and skill in the game concerned.

However, it is the big game temperament or psychological make up of the particular competitor or team that makes the crucial difference between the winner and the loser. In the current competitive age, teams and individual players play to win and this goal

of winning the match requires certain psychological nerves and also this creates psychological stress.

Until recently coaches and sports administrators were paying inadequate attention to the contribution of social and psychological factors to sports performance. However, since the early 1980's, there has been an ever increasing demand by both coaches and athletes for more professional service from sports scientists in the areas of exercise physiology, bio-mechanics, sports psychology, sports administration and skill instruction. The dominant theme of sports psychology revolves around the human development of sportspersons. Danish and Hale (1981) emphasised the human development of sportspersons as containing two aspects:

- (a) The individual sportsperson is an integrated biopsychosocial unit ; and
- (b) Individuals are viewed as developing in a changing biocultural context.

Hence sports administrators and coaches do give emphasis on the psycho-social development of sportsperson while undergoing training or preparation for future highly competitive matches. Under those circumstances, it is worthwhile to study the changes taking place in the psychological attributes of sportspersons over the designated period of time. This provides insight into the efficacy the psychological preparations and training imparted to sportspersons.

Significance of the Study

The findings of the present study would help sports psychologists, coaches and sports administrators in the following manner:

- (a) The present study would provide insight into the psychological attributes essential for better performance in high skill competitive sports.
- (b) The present study would also provide insight into the impact of sports competitive environment and training in the psychological attributes of sportspersons.
- (c) The present study would provide knowledge regarding adequacy of the psychological training imparted to young sportspersons.

- (d) The results of the present study would add further knowledge to the existing literature of sports psychology, especially the application of interactionist perspective in sports personology.
- (e) The findings of the study would provide guideline to the future researchers in sports psychology and sports sciences.

Conclusions

The following conclusions are drawn from the present study (Table 5.1).

1. The juvenile sportspersons and non-sportspersons differed significantly on psychological attributes like sociability, intelligence, emotional stability, dominance, shrewdness ego-strength, harria-premsia, zappia-coasthenia, self-sentiment and ergic tension.
2. Male and female sportspersons score significantly different on most of the psychological attributes from non-sportspersons on CPQ except on Factor C, Factor H, and Factor Q₄. On the other hand, male and female non-sportspersons scored significantly different on psychological attributes except on Factor E, Factor D, Factor G, Factor H, and Factor O.
3. There is no unequivocal support to the hypothesis that there would be no significant inter - sport group differences in psychological attributes of sportspersons. Significant differences were found between players of team games and players of individual games, only in case of the intelligence factor.
4. The juvenile sportspersons registered positive changes during the period under study on most of the factors of CPQ except on intelligence, desurgency-surgency, therctia-parmia and zeppia-coasthenia. In contrast, the non-sportsperson did not exhibit significant changes on many of the factors except Factor N, Factor Q₃ and Factor Q₄.
5. Both the male and female juvenile sportspersons registered changes on sociability, emotional stability, excitability, super-ego, strength and ergic tension. In addition, males showed significant changes on dominance, tough-mindedness and guilt-proneness where as females on self-senti-

ment. In contrast, male and female non-sportspersons did not register significant changes on most of the factors of CPQ.

6. The players of both individual and team games showed significant changes on sociability, dominance, excitability and ergic tension. In addition, the players of teamgames improved their position significantly on super-ego strength, threctia-parmia, dependency and guilt-proneness.
7. Though there was global significant changes in the psychological attributes of sportspersons on most of the factors of CPQ, there were divergent trends in changes attributed to different sportgroups. Following is the summary of such findings.

TABLE 5.1
Summary of findings of changes on psychological attributes
of sportspersons playing different games

| S. No. | Games | Attributes on which significant changes were registered |
|--------|-------------|--|
| 1. | Athletics | Sociability, emotional, stability, excitability, |
| 2. | Badminton | Sociability, emotional, stability, excitability, dependency, shrewdness, guilt proneness, self-sentiment and ergic tension. |
| 3. | Basketball | Sociability, emotional, stability, phlegmatic and dependency. |
| 4. | Football | Sociability, excitability, dominance, shrewdness and guilt proneness. |
| 5. | Gymnastics | Emotional, stability, excitability, dominance, shrewdness and guilt proneness and self-sentiment. |
| 6. | Hockey | Sociability, emotional stability, phlegmatic, super - ego strength threctia-parmia, dependency, shrewdness and self-sentiment. |
| 7. | Martial Art | Sociability, emotional, stability, submissiveness, shrewdness and guilt proneness sentiments and ergic-tension. |
| 8. | Volleyball | Emotional, stability, excitability, submissiveness, shrewdness and guilt proneness. |

8. All sports groups except the gymnastics group registered significant positive changes in the level of performance during the period under study. These positive changes were global for sports groups like individual games and players of team games.
9. Applying the variance components approach to the responses of modified CQ set items (incorporating sports specific situations) it was found that persons contributed 21.57% on the average to the total variances of psychological variables. On the other hand, situational factors contributed 19.77% and person \times situation interaction contributed 34.32% to the total variance. Hence, the findings of present study confirmed importance of situational factors and persons \times situation interaction for explaining behaviour.

Recommendations

1. Coaches and sports administrators should give greater emphasis on psychological training alongwith physical training and skill imparting to prepare sportspersons for sports competitions.
2. Selection of sportspersons should also rely upon desirable psychological attributes in addition to physical ability and skill of the athletes.
3. The negative psychological effects of vigorous physical training and competitive engagements should be valued against the other positive and negative effects.
4. Selection of potential champions at an early age and putting them in specified sports schools have desirable psychological and performance effects on the young and juvenile sportspersons. This policy should be further extended and more Sports Hostels should be established.
5. Psychological tests to measure leadership quality, achievement motivation, interests and attitudes should be periodically administered to sportspersons to find out their suitability for a particular game.

6. Psychological counselling should be part of sports training and professional sports psychologists should be employed as trainers and should accompany sportspersons on competitive tours.
7. Coaches should use the performance scale to compare sport performance of the same player over an interval or performances of a group of sportspersons at a point of time.

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Appendix-I

THE MODIFIED CQ-SET TEST

1. While playing a competitive game like football you prefer communicating with your team-mates by way of gestures.
2. You are considerate to other team-mates.
3. You are warm and responsive to rival competitors, referees and organisers of games.
4. You get along well with other athletes, coaches, referees and organizers of games.
5. You are sought after by other athletes.
6. As a football player, you are helpful and cooperative to other teammates.
7. As athlete you seek physical contact (touching, hugging, holding or being held) with others.
8. You tend to keep your thoughts, feeling vis-a-vis other athletes and sports achievement to yourself.
9. You develop genuine and close relationship with co-competitors, team-mates and coaches .
10. As an athlete, you have temporary inter-personal relationship. You are fickle in your friendship with other athletes.
11. When you fail to win a game you blame others.
12. Suppose you are defeated in a game and the next competition is just after this game. You feel nervous. You suck your thumb. You have temper tantrum.
13. You push and stretch limits for your advantage in sports situation. You see what you can get away in sports competitive environment.
14. As a sportsperson you are eager to please others.
15. You reciprocate feelings and behaviour with other athletes. You believe in fairness in sports. You think about welfare of other teammates.

16. You are pleased with and proud of your sports awards and achievements.
17. As a girl athlete you behave in a feminine style and manner.
18. You express negative feelings towards your peers, your team-mates directly and openly.
19. You are open and straight forward in sport competition situations.
20. You try to take advantage of others in games specially team games like hockey, football, etc.
21. You try to be the center of attention of other athletes by showing off/demonstrating your achievements/award in sports.
22. You try to manipulate other athletes, coaches, rivals, organisers and selectors by your charm, coyness and seductiveness.
23. You are fearful and anxious at the nick of a duel like a T.T. or badminton singles match against a competent rival.
24. You tend to brood and ruminate over your failure in winning match and awards.
25. You use and respond to reason in sports situations.
26. As an athlete you are physically active.
27. As an athlete you are visibly different from peers in appearance, size, or physical conditions (e.g. markedly tall or short, under or overweight, physically handicapped).
28. As an athlete you are vital, energetic and lively.
29. As a football player you are protective of the team-mates.
30. You tend to arouse liking and acceptance in adults specially parents, coaches, selectors, organisers and senior athletes.
31. You recognise the feelings of others. You are emphatic of other team-mates.
32. You tend to give, lend, and share with other athletes and team-mates.
33. You cry easily when you do not win a match or position.
34. You are restless when faced against an equally strong rival.
35. You feel inhibited as regards to your behaviour with coaches co-athletes, selectors and organisers.
36. You are resourceful in initiating sports activities/games.
37. You like to compete. You test and compare yourself against other competitors of your game/discipline.
38. You think and visualise in significantly different ways compared to your team-mates and co-athletes.
39. Suppose you are defeated in game and the next match is just few minutes away. You go on tapping your toes in the ground. You go on biting your nails.

40. You are curious and eager to learn new techniques in your game.
41. You give up easily while undergoing a rigorous training schedule.
42. You are an interesting/arresting athlete.
43. You recover easily after defeat in a match or failure to win award.
44. When in conflict or disagreement with other athletes, coaches or team-mates, you tend to yield and give in easily.
45. You withdraw from competition after an unexpected defeat.
46. You feel rattled and disorganised after a defeat in a game.
47. You set high standards of performance for yourself as an athlete.
48. You seek reassurance from coaches and parents about your worth as a sportsperson.
49. You show specific mannerisms or 'behavioural rituals like (e.g. tapping of fingers, biting of nails, biting of lips, sucking of thumbs etc.)
50. You have head-aches, stomach-aches, nausea etc. particularly in sports competitions.
51. You are agile and well coordinated in games.
52. You are physically cautious while playing games.
53. You feel as if you are in a fix at a crucial point like whether to go for defensive or offensive in a competitive game.
54. As an athlete you have rapid shifts in moods.
55. You are afraid of being deprived of the affection of coaches, parents. You are concerned of being deprived of your privileges as a sportsperson.
56. You are jealous and envious of your team-mates and competitors.
57. You tend to dramatise or exaggerate mishaps in sports like a muscle pull or stiff neck.
58. You are emotionally expressive (facially, gesturally or verbally) while playing a competitive game.
59. You are neat and orderly in dress and behaviour in sports on and off field.
60. You are anxious when you think that the outcome of your match is quite dicy.
61. You tend to be judgemental of the behaviour of other co-athletes, team-mates, coaches, referees, selector and organisers of games.
62. You are obedient of coaches and referees.
63. You are moved quickly when a lineman or referee gives a seemingly wrong decision.
64. You are calm, relaxed, easy-going before a competitive match, game or run.

65. You want that you should reach the top spot in sports quickly.
66. You are attentive and able to concentrate in competitive game/matches.
67. You think ahead about your moves in competitive game/matches.
68. As an athlete you appear to have high intellectual capacity.
69. You can express ideas about your sports' abilities, technique, ability of competitors well in the language you know.
70. You dream fantasies about winning matches or positions in sports.
71. You look to coaches, parents for help and direction for improving your sports performance.
72. You readily feel guilty and put blame on yourself for failures in sports.
73. You respond to humor, particularly after a tough game/match.
74. You become strongly involved in what you do with reference to your training programme, preparations for a competition etc.
75. You are cheerful during and after a competitive match/game.
76. As a team-mate and co-athlete you are trusted and dependable.
77. You feel yourself of being unworthy of a good sportsperson.
78. You are easily offended. You are sensitive to ridicule or criticism regarding your game/match and your techniques.
79. You are suspicious and distrustful of other competitors, team-mates, coaches and selectors.
80. You tease other athletes and team-mates.
81. You acknowledge unpleasant experiences and admit to own negative feelings due to failures to win a match/game.
82. You are self-assertive in the presence of co-athletes/competitors of coaches.
83. You seek to be independent and autonomous in pursuance of your goal to achieve something in sports.
84. You are a talkative athlete.
85. You are aggressive (physically or verbally) as an athlete.
86. You like to be yourself. You enjoy solitary activities after a game/match.
87. You tend to imitate and takeover the characteristics, manner and behaviour of champion sportsperson.
88. You are self-reliant and confident. You trust your own judgement regarding sports situations.
89. You are competent, skillful in your games.

90. You are stubborn as regards to points concerning your game.
91. You react excessively and in an emotional manner in competitive sports situations.
92. You are physically attractive and good-looking athlete.
93. You behave in a dominating manner with other athletes, coaches, and competitors.
94. You become sulky when you are challenged after a defeat in a game.
95. You overact to minor frustrations. You are easily irritated or angered when you are not given the due privilege, due court or lane.
96. You are creative in perception, thought, work or play.
97. You have an active fantasy life as regards to your sport/athletic achievements.
98. You are shy and reserved. You make social contacts with other sportspersons slowly.
99. You are reflective. You think and deliberate before speaking or acting in a sports competitive environment.
100. You are easily victimised by other athletes or children. They treat you as a scapegoat in games/athletics groups.

Appendix-II

THE SPORTS PERFORMANCE SCALE

1. Name of Sportsperson :
2. Grade :
3. Sports discipline :
4. Please mention the achievements of the sportspersons in his discipline as on September, 1990 and the subsequent improvements that has taken place during the intervening period. This can be done by answering the following questions :
 - As on September, 1990 was he/she a participant in International Tournaments/Meets/Competitions/Championships in the Senior Group representing India ?
 - a. After September, 1990 has she/he participated in International Tournaments/Meets/Competitions/Championships in the Senior Group representing India ?
 - b. As on September, 1990 was he/she a participant in International Tournaments/Meets/Competitions/Championships in the senior group representing India ?
 - b'. After September, 1990 was he/she a participant in International Tournaments/Meets/Competitions/Championships in the Junior Group representing India ?
 - c. As September, 1990 has she/he participant in Indian National Tournaments/Meets/Competitions/Championships in the Senior Group ?
 - c'. After September, 1990 was he/she a participant in Indian National Tournaments/Meets/Competitions/Championships in the senior group ?
 - d. As on September, 1990 was he/she a participant in International Tournaments/Meets/Competition/Championships in the Senior Group ?
 - d'. After September, 1990 has she/he participated in Indian National Tournaments/Meets/Competition/Championships in the Junior Group ?

- e. As on September, 1990 was he/she a participant in Inter-State Tournaments/Meets/Competition/Championships in the senior group ?
 - e'. After September, 1990 was he/she a participant in Inter-State Tournaments/Meets/Competition/Championships in the senior group ?
 - f. As on September, 1990 was he/she a participant in Inter-State Tournaments/Meets/Competitions/Championships in the Junior Group ?
 - f'. After September, 1990 was she/he a participant in Inter-district Tournaments/Meets/Competition/Championships in the Senior Group ?
 - g. As on September, 1990 was he/she a participant in Inter-district Tournaments/Meets/Competition/Championships in the senior group ?
 - g'. After September, 1990 was he/she a participant in Inter-district Tournaments/Meets/Competitions/Championships in the Senior Group ?
 - h. As on September, 1990 was she/he a participated in Inter-district Tournaments/Meets/Competition/Championships in the Junior Group ?
 - h'. After September, 1990 was he/she a participant in Inter-district Tournaments/Meets/Competition/Championships in the junior group ?
5. What are the specific achievements of the sportsperson as on September, 1990 and subsequent improvements thereof ? This may be cleared by answering the following questions :
- a. How many points achieved/goals scored/position secured/timing achieved by the sportsperson in the different level of Tournaments/Championships/Meets/Competitions mentioned in paragraph (4) a, b, c, d, e, f, and h by September, 1990 ?
 - b. How many points achieved/goals secured/timing achieved by the sportspersons in the different level of Tournaments/Meets/Competitions/Championships mentioned in paragraph (4), a, b', c', d', e', f', g' and h' after September, 1990 ?
1. Signature of Coach
 2. Signature of the Sportsperson
 3. Signature of School Principal.

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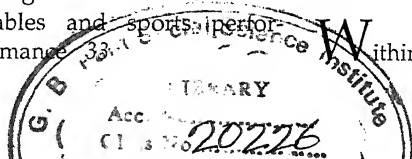
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